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GEOPHYSICAL ABSTRACTS
MINING DIVISION

ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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(3815)

1. GRAVITATIONAL METHODS

(2945) GRAVIMETRICAL SURVEY NEAR THE CITY OF KANSK IN 1932 (IN RUSSIAN)

By N. P. Makarov

Glavnoe Geologo-Gidro-Geodezicheskoe Upravlenie, Irkutsk, no. 6, 1935,
pp. 33-37

The gravimetrical survey described in this article was carried out from July 22 to November 7, 1932, in the salt district near the city of Kansk with the Askania torsion balance no. 134. Measurements were made at 340 stations. A map of gradients of gravity is given. The results of the work are summarized by the author as follows:

1. No salt domes were found.
2. The structure of the area close to the salt deposits was sufficiently well determined.
3. It was proved that the salt springs of the "Salt Lake" and those on the Kurysh River were situated on the same Kansk anticline.
4. The place for starting a deep drill hole for salt brine was determined. - W. Ayvazoglou.

(2946) GRAVIMETRICAL WORK ON THE PAMIR (IN RUSSIAN)

By B. L. Ochapovskiy

Academy of Sciences of the U.S.S.R., Leningrad, 1933. Tadjikskaia Kompleksnaia
Ekspedicia, 1932, pp. 384-389

This article contains a description of the gravimetrical work carried out in the central region of the Tadjikistan (Central Asia) in 1932. Nineteen stations at which measurements were made are shown on a map. A table gives the distribution of anomalies. - W. Ayvazoglou.

(2947) NEUERE ERFAHRUNGEN ÜBER DIE GENAUIGKEIT DER GRAVIMETER- UND PENDEL-MESSUNGEN

(RECENT EXPERIENCE IN THE ACCURACY OF GRAVIMETER AND PENDULUM MEASUREMENTS)

By A. Schleusener

Öl und Kohle, Berlin, vol. 11, no. 36, 1935, pp. 635-640

After a brief discussion of general principles of investigating the errors and remarks concerning the data of measurements used in the present case, the author gives some calculations of the accuracy of the gravimeter measurements and of the mean error of the Thyssen gravimeter as well as of the accuracy of pendulum measurements. This is followed by a summary of the results of pendulum and gravimeter measurements carried out at 104 stations, th a table showing the systematic and mean errors of the 104 pendulum meas- ements. In the last paragraph, Schleusener compares the accuracy attained pendulum measurements with those attained by the Thyssen gravimeter. Ac- rding to his statement, this comparison is unfavorable to the measurements de by pendulum, as the following mean errors are established:

Mean error in pendulum measurements - ± 2.0 milligal.

Mean error in gravimeter measurements - ± 0.3-0.4 milligal.

The conclusion is drawn that in order to continue the work with the pen- lum a mean error not over ± 1.0 milligal must be attained. - W. Ayvazoglou.

(2948) BASIC SURVEY DATA ESSENTIAL TO INDUSTRY

By William Bowie

Oil Weekly, Houston, vol. 79, no. 9, 1935, pp. 40-42

The necessity of topographic maps, geodetic surveys, and geophysical rveys to furnish fundamental data that will enable those engaged in the troleum, gas, and mineral industries to carry on their work more success- lly and with less waste is emphasized.

Basic surveys should be carried out by the Federal government. Gravity- rvey data should be supplemented by torsion-balance, magnetic, and seismic rveys. The detailed work should be done by the industries. - W. Ayvazoglou.

2949) ABSOLUTE GRAVITY SURVEY IN GULF COAST STATES WOULD BE OF GREAT VALUE TO PETROLEUM INDUSTRY

By Warren L. Baker

Oil Weekly, Houston, vol. 79, no. 9, 1935, pp. 38-40

In this and following papers published in this number of the Oil Weekly ppear statements on the value that could be derived from an absolute gravity rvey of the Gulf Coast States.

A proposition is made by the author of this article to erect monuments bench marks, with elevation above sea-level, at intersections of longitude d latitude lines at one-degree intervals; further, to determine the value absolute gravity at approximately 1,200 points. The survey should be rried out by the U.S. Coast and Geodetic Survey. The location of the pro- sed monuments and of the 1,200 stations is given in a map. The cost of ch a survey is estimated to be between $500,000 and $750,000.

The absolute gravity stations will serve as a basic network in the lf Coast States for more accurate regional interpretation of gravity sur- eys already existing and those to be made in the future. - W. Ayvazoglou.

(2950) ENVISAGED SURVEY WOULD BE OF GREAT COMMERCIAL VALUE

By Donald C. Barton

Oil Weekly, Houston, vol. 79, no. 9, 1935, pp. 42-44

Barton supports the project of establishing bench marks at intersections of longitude and latitude lines at intervals of one degree in the Gulf Coast, as well as the establishment of a series of absolute gravity base stations (see Baker's article above). - W. Ayvazoglou.

(2951) ECONOMIC POSSIBILITIES FROM MAPPING GULF COASTAL PLAIN ARE MANY

By E. H. Sellards

Oil Weekly, Houston, vol. 79, no. 9, 1935, pp. 44-46

Mapping the position of formations underground now has become of great importance. Gravity readings recorded at the stations proposed by Baker in his article "Absolute Gravity Survey" (see the article above) will aid greatly in the study of underground conditions. The economic possibilities of the deposits buried underground in the region adjacent to the Gulf of Mexico are very great. The proposed gravity survey will help greatly to determine underground conditions, on the correct understanding of which so much depends in the development of this part of the United States. - W. Ayvazoglou.

(2952) ÜBER DIE BESTIMMUNG DER FIGUR DER ERDE

(ON THE DETERMINATION OF THE FIGURE OF THE EARTH)

By N. Malkin

Gerlands Beiträge zur Geophysik, Leipzig, vol. 45, no. ½, 1935, pp. 133-14

An integral equation is deduced by means of Chasles' theorem, by which the figure of the geoid is determined from the gravimetrical observations for an arbitrary surface.

This equation is easily solved in the case of a sphere and leads, as a particular case, to the well known formula of Stokes. The estimation of the accuracy of Stokes formula in the case of a spheroid may be easily made and a second approximation yields an accuracy of the order of the square of the distance between the geoid and spheroid. For an arbitrary ellipsoid with three axes, the equation has an exact solution in the form of a series of Lamé functions with variable coefficients. - Author's abstract.

2. -MAGNETIC METHODS

(2953) MAGNETOMETRIC SURVEYING

By Bernard Happé

Mining Magazine, London, vol. 53, no. 4, 1935, pp. 217-219

After a brief theoretical discussion of magnetometric surveying the thor concludes by giving a few practical rules of procedure in the use of is method for the interpretation of given magnetic data:

1. The magnetic survey data should be corrected for normal and regional riations and, in the case of dip-needle readings, reduced to its horizontal d vertical components.

2. Sections of the observed anomaly should be constructed in the plane the magnetic meridian.

3. Taking into consideration the form of the curve thus obtained, toether with any known geological data as to the possible form of occurrence the assumed body, a section showing a hypothetical body is constructed to suitable scale.

4. The anomaly due to this hypothetical body is evaluated by means of e appropriate graticule, as outlined in the article, and the curve thus tained is plotted to a scale suitable for comparison with that constructed rom the observed data.

5. The hypothetical section is now modified by a process of trial and rror until a reasonable agreement is obtained between the actual and theoretial curves.

If, according to the author, careful consideration is given to the contruction of the first theoretical section the amount of modification and he number of stages in the evaluation will be reduced to a minimum. - W. yvazoglou.

(2954) ZUR METHODIK MAGNETISCHER LANDESAUFNAHMEN

(METHOD FOR NATIONAL MAGNETIC SURVEYS)

By M. Toperczer

erlands Beiträge zur Geophysik, Leipzig. vol. 45, no. $\frac{1}{2}$, 1935, pp. 184-188

At a comparatively small number of well-distributed stations the magnetic lements should be determined with the utmost accuracy; at intervening points he less accurate results of the field balance are to be checked and corected by means of the variometer, giving differences in intensity between hese and two or more accurate stations. - C.A.S., Science Abstr., vol. 38, . 454, 1935.

(2955) MAGNETIC ANOMALIES IN THE WESTERN REGION (IN RUSSIAN)

By A. A. Strona

Problems of Soviet Geology, Moscow, vol. 5, no. 9, 1935, pp. 864-875

In this article the author gives the results of magnetic investigations carried out in the western part of the U.S.S.R. The following regions, in which magnetic anomalies were observed, are examined.

1. Magnetic anomaly near Rogneda: Located 35 km. to the east of the city of Roslavl; area over 25 sq. km. From the character of the anomaly the conclusion is drawn that the disturbing masses are about 200 to 300 m. below the surface and are of considerable thickness.

2. Magnetic anomaly near Bariatinsk: A detailed magnetic survey was carried out 10 km. to the north and 3 km. to the south of the Smolensk-Sukhinichi railroad line. The axis of the anomalous zone passes 2 km. to the west of the station at Bariatinsk. The intensity increases to the north. Estimated depth, 300 to 400 m.; magnetic masses of considerable thickness.

3. Magnetic anomaly near Plokhino: Location about 35 km. to the south of the city of Kozelsk. The anomaly is caused probably by the Pre-Cambrian iron-ore masses. A detailed magnetic survey is recommended.

The latter two parts of the article deal with the numerous magnetic anomalies discovered in the southeastern and northern parts of the Western Region. A brief description of these numerous anomalies is given and a detailed investigation of these anomalies is recommended. - W. Ayvazoglou.

3. SEISMIC METHODS

(2956) GEOPHYSICAL OPERATIONS HAVE BEEN VERY SUCCESSFUL IN SAN JOAQUIN VALLEY DURING PAST YEAR

By Brad Mills

Oil Weekly, Houston, vol. 78, no. 4, 1935, pp. 28-29

The valley district suited to geophysical work is about 200 miles long and from 25 to 75 miles wide, but most of the geophysical activity has been confined to sectors relatively near oil or gas production. Fifteen geophysical crews are working, using reflection dip shooting. Reflection shooting has been checked many times and as a rule the results are very satisfactory.

Several factors definitely limit the value of geophysics in California. In the California, Pliocene, and Upper Miocene, with the rapid alterations of hard and soft beds, poor results are obtained. The lower Miocene and the ligocene with thicker beds yield better results. The Eocene and the Cre- aceous have thick beds, are well cemented, and are much more reliable than ay of the preceding. The three most favorable conditions are:

1. Where the Eocene or/and Cretaceous are present;
2. Where the basement complex is cut by a fault, against which oil collects;
3. Where the basement complex forms a ridge upon which oil-bearing beds overlap, thus trapping oil.

Most valuable geophysical operations are obtained in the flat, faulted, astern half of the San Joaquin and Sacramento Valleys, where few surface ndications are observed. - W. Ayvazoglou.

(2957) MOTION OF THE SURFACE OF THE EARTH IN THE COMPRESSIONAL PHASE OF A DEEP-FOCUS EARTHQUAKE, AND THE EFFECTS OF A LAYERED CRUST

By J. A. Sharpe

ulletin of the Seismological Society of America, Berkeley, vol. 25, no. 3, 1935, pp. 199-222

In this paper the difficulties which attend any attempt to obtain the round displacement which occurs during the passage of an earthquake wave ave been illustrated. Reliable curves of ground displacement are difficult o obtain because the majority of seismographs, as operated, are poorly adapted, or any purpose but the indication of the time of arrival of earthquake phases. his study has demonstrated, however, the practicability of an attempt to ob- ain ground displacement from seismograms, and has illustrated some of the ses which may be made of curves of ground displacement, when obtained.

The use of the dynamic magnification to obtain the amplitude of ground isplacement corresponding to an impulse on a seismogram was shown to give ighly erroneous results. For long-period seismographs, calculation of dis- lacement by methods in which the effect of transients was retained appeared o give fairly accurate results.

The results of the study of the effects of a layered crust on the sur- ace motion are to be considered only as preliminary, and indicative of the sefulness of a technique which hitherto has seldom been applied to seismic roblems. Displacements were indicated in the horizontal components of round displacement that were absent in the vertical, suggesting effects of rustal discontinuities. If the use of composite curves of surface displace- ent is valid, and the agreement between the observed and predicted curves f horizontal component of displacement is significant, the following are ossible conclusions: Oscillation in seismograms is a result of reflections nd transformations of primary waves within the crust; the average thickness f the crust beneath the stations whose records were studied is 32 km.; the elocity change at the base of the crust takes place in a distance which is mall compared to the wave length.

An appropriate research for individual stations possessing good seismographs in three components would be a study of the thickness of the crust underlying each station. For this purpose the wave velocities as determined from local earthquakes or explosions, and the arrival time of P (S*S) for a few deep-focus earthquakes of simple initial form, would suffice.

A knowledge of the curves of ground displacement would facilitate the solution of the following problems, among others: The effect of crustal discontinuities on the ground motion in the S phase; and the azimuthal variation of the form of the P wave in relation to the process at the focus. - Author's abstract.

(2958) THE RICHMOND QUARRY BLAST OF AUGUST 16, 1934

By Perry Byerly and James T. Wilson

Bulletin of the Seismological Society of America, Berkeley, vol. 25, no. 3, 1935, pp. 259-268

The records of the Richmond Quarry blast of August 16, 1934, indicate that the speed of longitudinal waves in the Franciscan formation of the San Francisco Bay region is 4.3 km/sec. The speed of transverse waves in the same medium is very probably 2.4 km/sec. The speed in the underlying medium is 5.4 km/sec. for the longitudinal waves and possibly 3.1 km/sec. for the transverse waves. The medium may therefore be identified as granite, which was to be expected from geological considerations.

The thickness of the Franciscan formation in the region, as computed from data given by this blast, is about one kilometer. - Author's abstract.

(2959) THE CENTRAL CALIFORNIA EARTHQUAKES OF MAY 16, 1933, and JUNE 7, 1934

By Perry Byerly and James T. Wilson

Bulletin of the Seismological Society of America, Berkeley, vol. 25, no. 3, 1935, pp. 223-246

Isoseismals are drawn and field intensities listed for the Niles earthquake of May 16, 1933. The epicenter is placed at $37^{\circ}38'$N, $121^{\circ}57'$W. Isoseismals are drawn and field intensities listed for the Parkfield earthquakes of June 7, 1934. The epicenter of the shock at 8^{h} 48^{m}p.m. (P.S.T.) is placed at $35^{\circ}56'$N, 56'N, 120°29'W. The epicenter of the shock at $8^{h}30^{m}$ is placed about 4 km. north of this. Travel-time curves are drawn for each of these three shocks. It is shown that the Owens Valley stations, Tinemaha and Haiwee, did not record the normal P (v=8.0 km/sec.,ca) for any of these earthquakes. It is concluded that there exists some barrier to these waves under the Great Valley of California (or possibly under the Sierras), which prevents their observation at stations so close to the valley as Tinemaha and iwee when the source is in the Coast Range region. The interpretation of e data is difficult, but there is some evidence for identifying P waves aveling through three successive layers of the earth's crust. A tentative mputation of this structure is made. - Author's abstract.

960) CONSISTENT GAIN IN USE OF GEOPHYSICAL METHODS SHOWN IN CALIFORNIA FIELDS

Editorial Note

Oil and Gas Journal, Tulsa, vol. 34, no. 25, 1935, pp. 158-162

A description of the increase in geophysical activities in California ring the past three years is given.

The cost of geophysical crews with instruments and drills was, according this note, $100,000 in 1933, about $750,000 in 1934, and by the close of 35 it will be approximately $1,250,000.

All of the geophysical exploration work undertaken in California during 34 and 1935 has been of the reflection seismograph type.

In December 1934 there were 15 reflection-seismograph crews operating in lifornia, and by June 1935 the number increased to 21.

Up to the present time geophysical work in California has been concenrated more or less exclusively in the San Joaquin Valley, Sacramento Valley, s Angeles Basin, Ventura Basin, and the Santa Maria Valley. Eighty percent the work was confined to the San Joaquin Valley. - W. Ayvazoglou.

(2961) THE REFRACTION OF A WAVE GROUP

By R. Stoneley

roceedings of the Cambridge Philosophical Society, Cambridge, vol. 31, no. 3, 1935, pp. 360-367

To reconcile the difference in direction of the wave front and the amlitude front, which characterizes the refraction of seismic waves at the nterface between two dispersive media, as, for instance, when a Rayleigh ave crosses the margin of a continent, it is necessary to suppose that the nplitude of a wave varies along the crest of the waves, so that the amplitude ront is arranged in échelon.

Mathematical discussion is given on: (1) The refracted altitude front; 2) the generalization of the classical theory of group velocity; (3) the efraction of an échelon system; and (4) the generalization of the Rayleigh heory.

The article is concluded with geophysical implications. - W. Ayvazoglou.

4. ELECTRICAL METHODS

(2962) GEOPHYSIKALISCHE STUDIEN MIT ELEKTRISCHEN METHODEN IN DEN U. d. S.S.R

(GEOPHYSICAL INVESTIGATIONS BY ELECTRICAL METHODS IN THE U.S.S.R.)

By C. and M. Schlumberger and P. Charrin

Bohrtechniker Zeitung, Vienna, vol. 53, no. 5, pp. 121-128, and no. 6, pp. 152-157, 1935.

The importance of geophysical work carried out in the U.S.S.R. in general and especially the application of electrical methods of prospecting for oil are mentioned. About 50,000 km.^{2} were electrically surveyed and about 6,000 electrical coring determinations along more than 1,500,000 meters of boreholes were made up to the end of 1933. The preference for applying electrical methods of prospecting for oil, instead of the seismic and gravimetrical methods used in the United States, is explained by the different geological conditions in these two countries. In the first part of this article the authors discuss electrical prospecting work carried out in 1934 in the regions of Grozny, Baku, and Emba. Examples are given.

The second part deals with electrical coring. Geological and electrical profiles of boreholes in various districts are presented. A similar article was published by the authors also in the "Revue Petrolifère", nos. 614 and 615, 1935 (see Geophys. Abs. 72, p. 1413). - W. Ayvazoglou.

(2963) EARTH-POTENTIAL MEASUREMENTS MADE DURING THE INTERNATIONAL POLAR YEAR

By G. C. Southworth

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 40, no. 3, 1935, pp. 237-255

Data are presented covering the normal diurnal variation of earth-potentials as measured at about a dozen different points, mostly in eastern United States. These data are arranged in graphical form for the convenience of the casual reader and also in numerical form for the use of the correlator. The data for Wyanet (Illinois), Houlton (Maine), and New York (New York) are based on nearly continuous recordings extending over a period of one or two years. This period includes the International Polar Year. At other points less extensive data were taken. These show the general characteristics peculiar to the location in question.

The data taken at Wyanet, Houlton, and New York have been analyzed for harmonic content. At New York the fundamental and, to a large extent, the harmonics, also, are directed along a northwest-southeast line. At Wyanet and Houlton these components tend to rotate with time. The pronounced directive effect noted near New York appears to prevail rather generally along the eastern part of the United States from Massachusetts to Florida and ssibly intc Cuba. The rotary effect noted in the Houlton and Wyanet data also found in data taken in the southern part of the Mississippi Valley. st of the data point toward the generally accepted view that there is a ose relation between earth-resistivity and the direction and magnitude of rth-potentials. However, there are some inconsistencies noted which tend make this less definite. - Author's abstract.

(2964) THE RELATIONSHIP OF MUD TO ELECTRICAL CORING

By H. C. H. Thomas

urnal of the Institution of Petroleum Technologists, London, vol. 21, no. 143, 1935, pp. 774-789

This paper was read at the forty-first general meeting of the Trinidad anch of the Institution of Petroleum Technologists held at the Apex Club, zabad, on January 30, 1935.

The purpose of this paper is the discussion and expression of opinion on e relationship of mud to electrical well survey owing to the fact that mechani- lly, physically and chemically, mud is the primary agent in modifying the ectrical characteristics of the formations when they are exposed by the drill.

A brief outline of the principles on which electrical logging is based is ven in the first part of the article, after which the author examines the in question under the following headings:

Effects of drilling mud on resistivity, in which the following factors e to be taken into consideration. (1) The permeability of the rock; (2) e colloidal extent of wall-sealing properties of the mud; (3) the electro- tic concentration of the fluid in the rock and of the mud; (4) the hydro- atic head of the mud and the formation pressure; (5) the time of contact; d (6) depth.

Porosity profiles. (1) Electro-filtration phenomena; (2) measuring of rosity; (3) electro-chemical forces.

Effect of mud on porosity. (1) Colloidal extent; (2) differential essure; (3) time of contact; (4) salinity of mud.

Interpretation of combined logs. Well logs representing profile made th good, light mud and that with poor, heavy mud at same electrolytic con- ntration are reproduced in a figure.

The lecture is discussed briefly. - W. Ayvazoglou.

(2965) LE PENDAGEMETRE ELECTROMAGNETIQUE ET LA DETERMINATION DE L'ORIENTATION DU PENDAGE DES COUCHES RECOUPÉES PAR LES SONDAGES

(ELECTROMAGNETIC INCLINOMETER AND THE DETERMINATION OF THE DIRECTION OF THE INCLINATION OF THE LAYERS PENETRATED BY BORING)

By C. and M. Schlumberger and H. G. Doll

From a mimeographed copy obtained from the authors.

The electromagnetic inclinometer is an apparatus that is lowered into boreholes by means of an electric cable. The apparatus enables us to measure the direction of the inclination of the layers traversed by the uncased part of the borehole, and, in addition to this, the degree and azimuth of the inclination of the borehole itself are given.

The measuring of the direction of the inclination is based on the anisotrophy of the sedimentary layers, the electrical conductivity of which is a maximum parallel to the stratification. In the case of angles of inclination over 10 degrees, and especially over 20 degrees, the accuracy of the orientation is of the order of 10 degrees in azimuth.

The measuring of the direction of the inclination of a given horizon (by taking the mean value of about twenty determinations) requires about two hours.

The electromagnetic inclinometer has only recently been used in industry, but extensive service has been rendered by it in various countries. At the present time there are about twenty inclinometers distributed mainly in the oi bearing regions.

A schematical design of the apparatus is given. - Author's abstract trans lated by W. Ayvazoglou.

(2966) LA PROSPECTION ÉLECTRIQUE DU BASSIN SALIFÈRE D'ALSACE

(ELECTRICAL PROSPECTING IN THE SALIFEROUS BASIN OF ALSACE)

By C. and M. Schlumberger

Communication made at the "Congrès International des Mines de la Métallurgie et de la Geologie Appliqué, Paris, October 1935, 15 pp.

In this communication the authors give briefly the results of electrical prospecting carried out from 1926 to 1932 in the northern part of the potassiu mines in Haut-Rhin. The problem of the geophysical work consisted of determining the prolongation of the Mulhouse potassium deposit to the north. Resistivity maps are given. Gravimetrical measurements were made at 560 statio to compare the results. According to the authors, less complete information, especially with regard to the evaluation of depths, was obtained from the grav metrical survey than from the electrical one. Some practical conclusions in prospecting for potassium are drawn. - W. Ayvazoglou.

(2967) U.S.S.R. PROSPECTING BY MEANS OF ELECTRICAL METHODS YIELD SOME INTERESTING RESULTS

By E. G. Leonardon and J. L. Mathied

l Weekly, Houston, vol. 79, no. 8, 1935, pp. 35-38, and no. 9, pp. 60-64

These two articles represent the translation and detailed abstracts of ticles written by C. and M. Schlumberger and P. Charrin and published in a Revue Petrolifère" (see Geophys. Abs. 72, p. 1413). - W. Ayvazoglou.

968) GEOELEKTRISCHE AUFSCHLIESSUNGSARBEITEN UNTER BENUTZUNG VON BOHRLÖCHERN

(GEOELECTRICAL PROSPECTING WORK BY USING BOREHOLES)

By J. N. Hummel

Öl und Kohle, Berlin, vol. 11, no. 36, 1935, pp. 648-650

The advantages of this method, especially with regard to the possibility obtaining information on the material and structure of the subsoil and the nstant registration of the data, are mentioned. A diagram of the electrical rehole profile, the interpretation of which does not offer difficulties to geologist and mining engineer, is given in a figure. - W. Ayvazoglou.

969) GEOELEKTRISCHE AUFSCHLIESSUNGSARBEITEN UNTER BENUTZUNG VON BOHRLÖCHERN

(GEOELECTRICAL PROSPECTING WORK BY USING BOREHOLES)

By J. N. Hummel

Petroleum, Berlin, vol. 31, no. 41, 1935, p. 4

This is an abstract from the paper presented by Hummel at the meeting of he "Deutsche Gesellschaft für Mineralölforschung und Brennkrafttechnische esellschaft," held September 26 to 28, 1935.

The following advantages of using boreholes in making electrical investiations are mentioned:

1. Important information can be secured on the material and structure of he subsoil.
2. Reliable results of measurements that can be reproduced.
3. Simple coordination between electrical and geological conditions reılting in a simple interpretation of the results of measurements.
4. Short period of work.
5. Great depth.
6. Low cost.

See also the abstract above.) - W. Ayvazoglou.

(2970) RADIO-SURVEY OF ORES, ITS EXTENT AND PLACE IN GEOLOGICAL RESEARCH WORK (IN RUSSIAN)

By G. B. Rogover

Non-ferrous metals, Moscow, vol. 10, no. 2, 1935, pp. 14-24

The applicability of the "Resonance-induction method of radio-surveying", developed by Korovin (see Geophys. Abst. 65, p. 1238), was examined by the author based on the results of this survey on the Bliava pyrite deposits carried out in 1933-34 and on the data obtained from mining. A map showing the location of the stations, a geological map of the region, and a few geological profiles are added. The method was proved to be sufficiently reliable. Its verification over deposits with various geological properties for determining a series of essential details is recommended. - W. Ayvazoglou.

5. RADIOACTIVE METHODS

(2971) A PRECISION RECORDING COSMIC-RAY METER

By A. H. Compton, E. O. Wollan, and R. D. Bennett

Review of Scientific Instruments, Lancaster, vol. 5, no. 12, 1934, pp. 415-422

The authors describe the construction of a cosmic-ray meter designed by them. The main features of the meter are as follows:

1. The ionization chamber consists of a spherical steel bomb with a net volume of 19.3 liters, filled with highly purified argon at 50 atmospheres pressure.

2. The balancing current is supplied by the ionization produced in a small auxiliary chamber by the beta-rays from an adjustable surface of metallic uranium.

3. For supplying the potential to the inner insulated surface of the sphere and to the balancing chamber, the authors use a 650-volt dry battery connected across a 2.6 megohm potentiometer.

4. The difference between the two ionization currents is measured with a Lindemann electrometer of standard construction in an airtight, dried chamber.

5. The shadow of the electrometer needle is projected through a compound microscope onto a continuously moving strip of 60 mm. bromide paper. This paper is moved by either an electrical or spring-motor clock.

6. To shield from the local radiation, a 17.3 cm. layer of lead shot of uniform size is used, which is equivalent to a layer of about 10.7 cm. of solid lead.

The last part of the article contains "Some essential details", such as aracteristics of pure argon; measurement of absolute ionization; residual nization; balancing; and performance.

The article is illustrated by 11 figures. - W. Ayvazoglou.

(2972) ÜBER DIE NACHLIEFERUNG VON RADIUMEMANATION AUS DEM ERDBODEN

(ON THE AMOUNT OF RADIUM EMANATIONS GIVEN OFF FROM THE SOIL)

By P. Robert Zeilinger

rrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 40, no. 3,
1935, pp. 281-294

The amount of radon given off from the soil was measured by the method of Zupancić with certain improvements. From December 1933 to October 1934, 50 measurements were made at two points in a meadow near Hotting; observations eing made alternately. The average value is 43.5 x 10^{-18} curie per cm^2 per ec. Considering the fact that very few measurements were made in the autumn, t must be concluded that the annual average is nearly 50 x 10^{-18} curie per n^2 per sec. This agrees well with the results of Smyth (Dublin) and Wright nd Smith (Manila), who obtained 73 x 10^{-18} and 20.5 x 10^{-18} curie, respecively. It is interesting to note that P. Zupančič, in the garden of the Intitute in Innsbruck, obtained an average exhalation of 25 x 10^{-18} curie per n^2 per sec. (December-July), which is about half as much as was obtained by he author on the meadow in Hötting, where the soil was never mixed with fragents of brick, etc. It was found that the meteorological factors governing he exhalation of radon are not the same at different seasons of the year. n winter the influence of snow or ice in the ground prevails. The emanation ncreases rapidly when the snow is melting. In spring rather large variations n the amount of emanation were found corresponding to large differences of emperature, etc. A lawn-covered area gives off less radon than an area of he same soil without lawn. The highest values of emanation were found in uly and August. The relationship of emanation to different meteorological actors is discussed. Wind decreases the amount of emanation measured. This ay be due to the removal of radon within the collecting vessel by the small apid changes of barometric pressure during high winds. The daily variation f emanation was studied and found in good agreement with the curve of P. upančić. Simultaneous measurements of the radon-content of open air showed daily variation similar to that of the emanation in the soil. - Author's bstract.

(2973) ÜBER EINIGE BEI JONENMESSUNGEN MIT ZYLINDERKONDENSATOREN AUFTRETENDE STÖRUNGEN

(ON SOME IRREGULARITIES OBSERVED DURING ION MEASUREMENTS WITH CYLINDRICAL CONDENSERS)

By N. Weger

The cause of a spontaneous decrease in the residual effect ("Resteffekt") and the appearance of another disturbance - the influence effect ("Influenzeffekt") - are discussed, the origin of the latter being attributed to imperfect insulation. Various observed irregularities are explained by the influence effect and the influence of temperature differences on mobility measurements. - Author's abstract.

(2974) ON THE DIFFUSION OF RADIOACTIVE EMANATIONS IN ROCKS (IN RUSSIAN)

By A. G. Grammakov and N. M. Liatkovskaia

Journal of Geophysics, Moscow, vol. 5, no. 3, 1935, pp. 290-306

Theory is discussed and experimental data are given on the diffusion of radioactive emanations in rocks. The following cases are theoretically considered:

1. Diffusion occurring within an endless cylinder filled with rock.
2. Within a cylinder of finite dimensions.
3. Diffusion of the emanation from a radioactive object having a spherical shape.
4. From an object having the shape of a sufficiently long cylinder.

Formulae are given for the distribution of the concentration corresponding to these cases.

The coefficients of diffusion were determined experimentally for the emanations of radium and thorium. A schematical design of the apparatus is given and the data obtained are shown in tables and graphs.

The following conclusions are drawn by the authors:

1. The diffusion of the radioactive emanations in rocks depends, to a large extent, on the nature of the rock owing to which the value of the diffusion coefficients may change within considerable limits.

2. The emanation spreads more rapidly in sands than in clays.

3. A mixture of dry clay and sand differs but little, in its gas permeability, from dry clay.

4. The diffusion coefficient of the emanations in a natural mixture of clay and sand is smaller than that in pure sand and pure clay.

5. The rapidity of diffusion depends, to a large extent, on the moisture the rocks: In damp rocks the diffusion occurs very slowly as compared with at in dry rocks. - W. Ayvazoglou.

6. GEOTHERMAL METHODS

(2975) VORLÄUFIGER BERICHT ÜBER VERSUCHE MIT EINEM THERMISCHEN AUFSCHLUSSVERFAHREN

RELIMINARY REPORT ON EXPERIMENTS WITH A THERMAL METHOD OF EXPLORATION)

By M. Paul

Öl und Kohle, Berlin, vol. 11, no. 36, 1935, pp. 641-643

The theory of thermal methods of exploration is discussed in the first art of this article. The second part deals with practical measurements. orty-four temperature measurements were made by Paul between March 25 and pril 12, 1935, and 140 between June 4 and July 29 in boreholes over a salt ome in the Province of Hannover. The method of work is described and the esults are examined and illustrated by graphs.

The conclusion is drawn that the thermal method of exploration cannot eplace the other methods, but it may be an advantageous addition to them, s the differences in the conductivity of heat may provide characteristics ther than those disclosed by the differences in density. - W. Ayvazoglou.

2976) METHODS OF THE REGULAR REGIME (SYSTEM) AS APPLIED TO THE DETERMINATION OF THERMAL CONSTANTS OF ROCKS (IN RUSSIAN)

By M. A. Bereskin and G. M. Kondratiev

Journal of Geophysics, Moscow, vol. 5, no. 3, 1935, pp. 307-323

After a brief description of the present methods for determining the eat conductivity and temperature distribution of solid non-metallic material, in particular of rocks, the authors describe the new method of complex determination of thermal constants - i.e., of heat conductivity, heating capacity, and temperature distribution of rocks. The new method is called "Method of regular regime."

The principles of the theory of this method, based on a common law of cooling solids, are discussed and the results of the experiments made with some specimens of rocks are given. The apparatus and technique of the experiments are described.

A few examples to verify the new method on some typical rocks are given. - W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(2977) CONTRIBUTION TO GEOPHYSICAL PROSPECTING OF COMPLEX ORE DEPOSITS (IN RUSSIAN)

By P. F. Rodionov and N. I. Safronov

Non-Ferrous Metals, Moscow, vol. 10, no. 5, 1935, pp. 7-17

The results of geophysical surveys carried out in various districts in the Altai Mountains, Karatau Ridge (Southern Kazakstan), and Karamazar Region are discussed and the possibility of their successful application proved. In order to obtain the best results, the application of combined geophysical methods in close cooperation with geological suverys is recommended. - W. Ayvazoglou.

(2978) ERSTE MESSUNGEN MIT EINEM NEUEN GERÄT ZUR QUANTITATIVEN BESTIMMUNG BRENNBARER GASE IN DER LUFT DER OBERSTEN ERDSCHICHTEN

(FIRST MEASUREMENTS WITH A NEW APPARATUS FOR QUANTITATIVE DETERMINATION OF COMBUSTIBLE GASES IN THE AIR OF THE UPPERMOST EARTH'S LAYERS)

By A. Graf

Öl and Kohle, Berlin, vol. 11, no. 36, 1935, pp. 644-648

Hydrocarbons could be determined with surety in the uppermost layers over oil-bearing deposits by using the new apparatus; whether the gas penetrated by diffusion or through fissure could not be established. Therefore, a spatial general investigation of a geologically well known oil-bearing region by making hundreds of measurements is necessary. A decision on the efficiency of the apparatus, especially on the positive and negative limits of the new method, can be made only after measurements have been carried out on a large scale. - Author's abstract translated by W. Ayvazoglou.

(2979) JEFFERSON ISLAND SALT DOME, IBERIA PARISH, LOUISIANA

By Lawrence O'Donnell

Bulletin of the American Association of Petroleum Geologists, Tulsa, vol. 19, no. 11, 1935, pp. 1602-1644

After a detailed description of the Jefferson Island salt dome under the headings "location", "physiography", "early history of Jefferson Island", "salt exploration", "paleontology", "geology", "salt spine", "lake Peigneur", and "minerals in cap rock", the author mentions the geophysical surveys made on Jefferson Island dome. As a result of the first survey, an electrical one, sulphur was discovered at a depth of 660 feet in a supposedly deep flank oil test. Later, both torsion balance and seismograph surveys were made for the purpose of outlining the cap-rock area of the dome. Headings following the physical discussion are "origin of cap rock", "origin of sulphur", "ex-ration of sulphur", "mining operations", and "mining efficiency at Barba, isiana".

This article is illustrated by 16 figures. - W. Ayvazoglou.

(2980) STRUCTURE AND COMPOSITION OF THE GLOBE (IN RUSSIAN)

By J. J. Zaslawsky

Journal of Geophysics, Moscow, vol. 5, no. 3, 1935, pp. 280-289

The author discusses his own scheme of the structure of the earth, taking to consideration the process of the compression of the internal layers, d examines, from the volumetric viewpoint, the results obtained by other thors. - W. Ayvazoglou.

(2981) CONGRÈS INTERNATIONAL DES MINES, DE LA MÉTALLURGIE ET DE LA GÉOLOGIE APPLIQUÉE (VII^e SESSION)

NTERNATIONAL CONGRESS OF MINING, METALLURGY, AND APPLIED GEOLOGY, 7th SESSION)

Editorial note

La Revue Petrolifère, Paris, no. 654, October 26, 1935, pp. 1368-1377

This congress was held October 20 to 26, 1935, in Paris. The following stracts of papers on geophysics presented at this congress are given in is editorial note:

1. *Projct d'Atlas géophysique. Prospections géophysiques récentes in sace*. (Plan of a geophysical atlas. New geophysical prospecting in Al-ce). By E. Rothé. A definition of the Geophysical Atlas is given. Exam-es of investigations made in Alsace by Wenner's method and by other resis-vity measurements are presented.

2. *La prospection électrique du bassin potassique d'Alsace*. (Electrical ospecting of the potassium basin of Alsace). By C. and M. Schlumberger. e magnitude of the Quaternary alluviums of the Rhine and of the Oligocene rl, which cover the salt formations containing potassium, was determined the plain of Alsace by electrical methods of prospecting. The work estab-shed clearly the existence of the salt in the form of a very long straight dge and of one cap with steep walls.

The results of the electrical investigations were checked by a series of reholes.

3. *La méthode variométrique pour l'exploration électrique minière et ratigraphique du sous-sol*. (Variometric method of electrical and strati-aphical exploration of the subsoil). By A. Zabelli. The problem of the an depth to which a current may penetrate, its resistance, inductance, and pacity; and the relations that may be established between the data obtained the surface and the changes in the subsoil, are discussed.

4. Sur une application de la methode electromagnetique à la prospection des anticlinaux. (On the application of the electromagnetic method in prospecting for anticlines). By H. Galbrun and L. Cagniard. A method is describe which consists of an arragnement by which the magnetic field is determined in the center of a loop with a diameter of several hundred meters, through which an alternating current of audio frequency passes.

5. Sur les principes de la prospection électromagnètique par courant alternatif à très basse fréquence. (On the principles of electromagnetic prospection by alternating current at a very low frequency). By Sabba S. Stefanescu. Calculations necessary for interpretation of the data obtained from electrical prospecting methods can be simplified greatly if a frequency with a tendency toward zero is applied. In case of horizontal layers, considerable advantage can be had by comparing with the work with a direct current.

6. Les anomalies magnetiques à Madagascar et leurs relations avec des phènomènes gèologiques. (Magnetic anomalies in Madagascar and their relation to geological phenomena.) By André Savornin and Henri Besaire. The anomalies determined are closely connected with structure and mineralization. Prospecting of placers of Tsimbolovo with Schmidt's balance disclosed the expected continuations as well as interesting concentrations.

7. Anomalies de la déclinaison magnétique sur la montagne de Vinarice et leurs consequences géologiques. (Anomalies of magnetic declination on the mountain of Vinarice and their geological consequences.) By F. Čechura. The distribution of the anomalies of magnetic declination over the basalt in the mountain of Vinarice, near Kladno and vicinity, proves the existence of a dislocation. Its location, determined by magnetic measurements, is in accord with the data obtained by mining. The methods of measurements and calculations are described in detail.

8. Recherches geophysiques (geomagnetiques et radioactives) du terrain au voisinage de Bratislava. (Geophysical investigations (magnetic and radioactive) in the neighborhood of Bratislava.) By Čechura and J. Splichal. Geophysical investigations carried out by magnetic and radioactive methods near Bratislava are described. From the results obtained by both methods, an 80 m. zone of disturbance was established.

9. Sur l'etat actuel du développement des instruments de mesure de l'intensite de la pesanteur. (On the present development of instruments for measuring the intensity of gravity.) By A. Graf. The author explained the principle of a new gravimeter that can be used statically as well as dynamically. Variations of gravity may be obtained by measuring the time of oscillation as well as by observing the declination.

10. Quelques anomalies de pesanteur dans le Nord de Java. (Some gravity anomalies in the northern part of Java.) By L. M. H. Vreugde. The author explained the map representing Bouguer's isanomalies in the northern part of Java calculated from the data obtained by torsion balance measurement.

11. Methode et appareillage pour un procede chimique applicable à la herche des gisements de petrole. (Method and apparatus for a chemical cess applicable to the search of oil deposits.) By A. Graf. A description of the geochemical method of prospecting and of the apparatus assigned measuring small amounts of combustible gas occurring in the soil air r the surface is given. - W. Ayvazoglou.

82) DIE GEOPHYSIK AM "CONGRES INTERNATIONAL DES MINES" IN PARIS, OKTOBER 1935

OPHYSICS AT THE INTERNATIONAL MINING CONGRESS IN PARIS, OCTOBER 1935)

Editorial note

Petroleum, Berlin, vol. 31, no. 43, 1935, pp. 7-8

Abstracts of papers on geophysics presented at the meeting of the "Congrès ternational des Mines," held in Paris from October 20 to 26, 1935, are ven (see the abstract above). - W. Ayvazoglou.

9. NEW BOOKS

83) Keilhack, K. Grundwasser und Quellen-Kunde (ground-water hydrology), 3d edition, 1935. Gebrüder Borntgraeger, Berlin, 575 pp., 1 table, 308 figs. From a review by George M. Hall in the Bulletin of the Association of Petroleum Geologists, vol. 19, no. 11, 1935, we read: In general plan, the edition of this standard work, which has recently appeared, follows the original volume. The first major division deals with the basis sciences which are essential to ground-water hydrology and is only slightly changed. The second major division, which treats of ground-water hydrology and its related problems, has been enlarged. Many of the chapters have been expanded and several new chapters have been added. The new chapters on geophysical apparatus and methods as applied to ground-water problems have been written by the author's colleagues, H. Reich and A. Ebert. Density and seismic and electrical methods are discussed, but more space is devoted to resistivity methods. A brief reference is made to radioactivity methods. The third major division is a short discussion of German ground-water law and German court decisions. An innovation in this edition is the inclusion of a bibliography of 248 titles. This carefully selected list of papers should prove most useful.

10. PATENTS

(2984) COMPOUND SEISMOGRAPH

Ludwig W. Blau, Morris M. Slotnick, and Louis Statham, Houston, Tex., assignors to Standard Oil Development Co., a corporation of Delaware.

U.S. Patent 2,018,756 Issued October 29, 1935.

In a seismograph, a frame, a mass, a helical spring for resiliently suspending the mass from the frame whereby seismic waves effect oscillation of the mass, an auxiliary mass, a helical spring for resiliently suspending the auxiliary mass from the first mentioned mass, and means for recording the relative movement between the auxiliary mass and the frame.

Claims allowed - 10.

(2985) SEISMIC SURVEYING

John E. Owen, Bloomfield, N.J., assignor to Geophysical Research Corporation, New York, N.Y., a corporation of New Jersey.

U.S. Patent 2,018,737 Issued October 29, 1935

This invention relates to a method of seismic surveying that comprises successively producing artificial seismic waves at points in the immediate vicinity of each other in the earth's surface; successively receiving the waves thus produced at a common distant point in the earth's surface; independently recording the received waves; and subsequently combining a plurality of individual records thus obtained into a composite record by algebraically adding the corresponding instantaneous amplitudes of said individual records.

Claims allowed - 4.

(2986) PROCÉDÉ POUR LA DÉTERMINATION DE LA NATURE DU SOUS-SOL AU MOYEN DE L'ELECTRICITÉ

(METHOD FOR DETERMINING THE STRUCTURE OF THE SUBSOIL BY MEANS OF ELECTRICITY)

Conrad Schlumberger of France (Seine)

French patent 450,784 Issued April 3, 1913

This invention relates to a method for determining the structure of the subsoil. It consists in drawing on the surface of the ground a map of potentials near two points, between which a constant or variable difference of potential is applied by means of a suitable generator and an insulated conducting line; and of comparing the differences between the map obtained in this way and a map drawn over a homogeneous ground known a priori.

Claims allowed - 1.

987) PROCÉDÉ POUR LA DÉTERMINATION DE LA NATURE DU SOUS-SOL AU MOYEN DE L'ÉLECTRICITÉ

ETHOD FOR DETERMINING THE STRUCTURE OF THE SUBSOIL BY MEANS OF ELECTRICITY)

Conrad Schlumberger of France (Seine)

ench patent 460,179 Issued November 25, 1913

This invention relates to a method for determining the structure of the
bsoil and consists of drawing a map of potentials and comparing this map
th the map of potentials drawn over a known homogeneous ground.

Claims allowed - 1.

(2988) PROCÉDÉ D'INVESTIGATION DU SOUS-SOL

(METHOD OF PROSPECTING THE SUBSOIL)

Conrad Schlumberger of France (Seine)

ench patent 524,577 Issued September 7, 1921

This invention relates to a method of prospecting the subsoil and con-
sts essentially in emitting Hertzian waves by any suitable antenna and of
oserving the effects of the induction manifested by the conducting body
nder investigation upon a suitable receiving apparatus located so as not
o be directly influenced by the waves emitted by the antenna.

Claims allowed - 1.

2989) APPAREIL POUR DÉTECTER LES MASSES DE CONDUCTIBILITÉ ÉLECTRIQUE ANORMALE QUE REFERME LA TERRE ET DETERMINER LEUR POSITION

APPARATUS FOR DETECTING MASSES OF ABNORMAL ELECTRIC CONDUCTIBILITY HIDDEN IN THE GROUND AND DETERMINING THEIR LOCATION)

N. V. "Erda" Maatschappij voor Wetenschappelijk Aardlagen Onderzoek, of
etherlands

rench patent 553,013 Issued May 11, 1923

This invention relates to an apparatus for detecting masses of abnormal
onductibility hidden in the ground. The distribution of the electrical po-
ential or the form of the equipotential lines are determined on the surface
f the ground or along the boreholes between the electrodes located suitably
ith respect to the objects under investigation.

Claims allowed - 1.

(2990) PERFECTIONNEMENTS AUX MODES DE RECHERCHE DE MINERAIS AU MOYED D'ONDES ÉLECTROMAGNÉTIQUES

(IMPROVEMENTS IN THE METHODS OF PROSPECTING FOR MINERALS BY MEANS OF ELECTROMAGNETIC WAVES)

Karl Sundberg of Sweden

French Patent 556,867 Issued July 28, 1923

This invention relates to the methods of prospecting for minerals, consisting of determining at various points the intensity of the electromagnetic waves transmitted from a station by means of one or several receiving stations the antennas being located on the region under investigation.

Claims allowed - 1.

(2991) PROCEDES POUR DECOUVRIR LES GISEMENTS TERRESTRES PRECIEUX

(METHOD FOR DISCOVERING VALUABLE DEPOSITS IN THE GROUND)

N. V. "Erda" Maatschappij voor Wetenschappelijk Aardlagenonderzoek of Netherlands

French Patent 565,688 Issued February 2, 1924

This invention relates to a method for discovering valuable deposits. It is based on determining the distribution of the currents and electrical tension in the ground, and consists in examining the distribution of the electricity in the ground under the influence of a direct current, either natural or produced artificially; of an alternating current of low frequency; and of an alternating current of high frequency. Independently of the kind of the current, the current is transmitted to the ground to be examined by means of a system of electrodes consisting of a central electrode and several additional electrodes encircling it and connected with the central electrode.

Claims allowed. - 1.

(2992) PROCEDE POUR FACILITER LA DECOUVERTE DE GISEMENTS A L'AIDE D'ONDES ÉLASTIQUES PÉRIODIQUES

(METHOD FOR FACILITATING THE DISCOVERY OF DEPOSITS WITH THE AID OF PERIODICAL ELASTIC WAVES)

N. V. "Erda" Maatschappij voor Wetenschappelijk Aardlagenonderzoek, of Netherland

French Patent 565,689 Issued February 2, 1924

This invention relates to a method for facilitating the discovery of deposits by observing the effect of earthquakes produced artificially. The

hod consists of periodically sending into the ground elastic waves and ob-
ving the manner in which the intensity of radiation recorded by seismo-
phs at various points varies in function of the frequency of emission and
pagation of the waves in the ground by comparing the phases of the waves
sing through different points in the ground.

Claims allowed - 1.

2993) PROCEDE POUR DETERMINER SI UNE EAU SOUTERRAINE CONTIENT DU SEL

(METHOD FOR DETERMINING WHETHER SUBTERRANEAN WATER CONTAINS SALT)

N. V. "Erda" Maatschappij voor Wetenschappelijk Aardlagenonderzoek, of
lland

ench Patent 565,691 Issued February 2, 1924

This invention relates to a method for determining whether subterranean
ter contains salt. The method consists of emitting electromagnetic waves
rough the ground to be investigated, preferably waves of different lengths,
d of determining the components of the magnetic force of the electromagnetic
ves returning from the interior of the ground. The apparatus emitting elec-
omagnetic waves is disposed with respect to the receiving apparatus in such
way that the latter is placed in the direction of the most feeble radiation.

Claims allowed - 1.

994) PROCEDE POUR DECOUVRIR LES GISEMENTS TERRESTRES A L'AIDE D'ONDES ELECTROMAGNETIQUES

ETHOD FOR DISCOVERING UNDERGROUND DEPOSITS BY MEANS OF ELECTROMAGNETIC WAVES)

N. V. "Erda" Maatschappij voor Wetenschappelijk Aardlagenonderzoek, of
lland

rench Patent 565,692 Issued February 2, 1924

This invention relates to a method for determining the location of under-
round deposits differing from the rocks adjoining them by their electrical
r dielectrical properties. The method consists of sending through the ground,
 be examined, electromagnetic waves produced by a transmitting apparatus,
d of determining the direction of the waves at one or several receiving sta-
ions by means of receiving apparatus.

Claims allowed - 1.

(2995) PROCÉDÉ POUR LA RECHERCHE DES ZONES SOUTERRAINES SE DISTINGUANT DE LEUR ENTOURAGE PAR LEUR CONDUCTIBILITÉ ÉLECTRIQUE

(METHOD OF PROSPECTING SUBTERRANEAN ZONES DIFFERING IN THEIR ELECTRICAL CONDUCTIBILITY FROM THOSE SURROUNDING THEM)

N. V. "Erda" Maatschappij voor Wetenschappelijk Aardlagenonderzoek, of Netherlands

French Patent 567,221 Issued February 27, 1924

This invention relates to a method of prospecting for subterranean bodies the electrical conductibility of which differs from that of the bodies surrounding them, by sending electric currents across the zone of exploration and by determining the course of the current lines, equipotential lines, etc. If, in the zone under exploration, there are known deposits or disturbing formations, these deposits and disturbing bodies may be isolated by using one or several auxiliary electrodes suitably distributed. In certain cases, good results may be obtained by using the mineral deposit itself as an auxiliary electrode by connecting it directly to one of the main electrodes.

Claims allowed - 1.

(2996) PROCEDES POUR LA DÉTERMINATION DES GÎTES PÉTROLIFÈRES

(METHOD FOR DETERMINING OIL DEPOSITS)

Conrad Schlumberger of France (Seine)

French Patent 615,290 Issued January 4, 1927

This invention relates to a method consisting of prospecting for oil by measuring the electrical conductivity of the ground and by determining, from the observations obtained in this way, the points of maximum salinity - that is, the point in which oil and gas may be expected. The method is realized in practice by making a series of systematic measurements of electrical conductivity of the ground under investigation and then by comparing the results obtained and selecting zones of maximum conductivity.

Claims allowed - 1.

97) PROCEDE POUR LA DÉTERMINATION DE LA RÉPARTITION LOCALE DE LA CAPACITÉ CONDUCTRICE D'ÉLECTRICITE DANS LE SOUS-SOL

ETHOD FOR DETERMINING THE LOCAL DISTRIBUTION OF THE CONDUCTIVE CAPACITY OF ELECTRICITY IN THE SUBSOIL)

Richard Ambronn of Germany

ench Patent 622,108 Issued May 24, 1927

This invention relates to the method for determining the local distribu-
on of the conductive capacity of the subsoil by means of alternating elec-
ic currents. Means are provided and arrangements established for measuring,
ter the alternating current is sent into the ground, the direction, intensity,
gular displacement, as well as local distribution of various components.

Claims allowed - 10.

998) PROCEDE POUR LA DETERMINATION DE LA PROFONDEUR DES VENUES D'EAU DANS LES SONDAGES

(METHOD FOR DETERMINING THE DEPTH OF WATER FLOWING INTO THE BOREHOLES)

ciété de Prospection Electrique (Procedes Schlumberger) of France (Seine)

ench Patent 673,872 Issued January 21, 1930

This invention relates to the electrical method for determining the depth
water flowing into a borehole. The method consists of lowering into a bore-
le gradually a metallic electrode suspended to an insulated conductor and of
asuring the variation of the electromotive force between the electrode and
e water filling the borehole at the moment when this electrode traverses the
ueous horizon.

Claims allowed - 4.

999) PROCEDÉ ELECTRIQUE ET APPAREIL POUR LA DETERMINATION DES TERRAINS TRAVERSES DANS LES SONDAGES

LECTRICAL METHOD AND APPARATUS FOR DETERMINING THE FORMATIONS OF THE GROUND TRAVERSED BY BORINGS)

ciété de Prospection Électrique (Procédés Schlumberger), of France (Seine)

rench Patent 678,113 Issued March 19, 1930

This invention relates to "electrical coring", by which the mechanical
ring is to be replaced. The method consists in measuring from the surface
the ground at different depths, in the non-tubed part of the hole, the
lectrical resistivity of rocks traversed by drilling; and of drawing, with
he aid of the data obtained in this way, a diagram showing the electric
arameter of various rocks.

Claims allowed - 1.

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A. No. 82 DEPARTMENT OF THE INTERIOR February 1936
UNITED STATES BUREAU OF MINES
John W. Finch, Director

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GEOPHYSICAL ABSTRACTS
MINING DIVISION

ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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1. GRAVITATIONAL METHODS

(3000) ISOGRAVITATIONAL SURFACES

By G. P. Gorshkov

Bulletin Geodésique, Paris, no. 43, July-August-September 1934, pp. 119-126

The isogravitational surface is shown not to coincide with the isopotential surface; the angle between the normals to the two curves is derived. Application to the earth shows that this angle is about 11.7' at latitude 45°. The isogravitational surfaces are very close to spheres. Some of the properties are discussed; they have some importance in the interpretation of torsion-balance observations. - T.L.M., Science Abs., vol. 38, no. 455, 1935.

(3001) TEST OF APPROXIMATE FORMULA FOR RAPID COMPUTATION OF WARPING OF THE GEOID

By F. W. Darling

Bulletin Geodesique, Paris, no. 44, October-November-December 1934, pp. 266-273

The formula $H_R=36dH/4\rho a$ has been tested with a=6371.2 km, d=96 km, σ=2.67, ρ=5.5168 (which gives H_R=0.00547 H), H=h+1400 m on land and 1400 m-0.615h on water;h was determined by averaging the height (or depth) over a circle of radius 213 km around each of 22 stations in the U.S.A. and 9 on the oceans. The average discrepancy from the "true" value of H_R is 1.7 m (that is, 18.7 percent), the greatest 4 m in two cases. With less detailed maps and a less experienced reader the discrepancies averaged >2.7m. - C.A.S., Science Abs., vol. 38, no. 455, 1935.

(3002) NEW THEORY OF CONTINENTAL SPREADING

By Arthur Wade

Bulletin of the American Association of Petroleum Geologists, Tulsa, vol. 19, no. 12, 1935, pp. 1806-1818

The thesis may be considered a corollary of Gutenberg's theory of continental spreading. The paper should be read in conjunction with those by Gutenberg.

Few assumptions are required if it be granted that our distinctions between solid and liquid are artificial and expedient rather than actual and that what we term solids may flow with a time factor that is great and may approach infinity. It must be assumed also that the original crust of the earth was of sima and that the lighter sial was formed from it.

A compromise is effected between the concepts of performance of conti-
tal masses and of instability and movement relative to one another. For
causes that produce the elevations and depressions on the original sial
ets are such as might permanently affect such parts of the sheets. Thus,
h original land areas and water-filled depressions would be persistent,
ugh they would tend to increase in area with the spreading of the sheets.
nges of form would take place as isostatic conditions became affected
ally both by added loads of light sediments deposited by the ordinary
ncies and by the thinning of the sheets in other places by erosion. The
d bridges between continents, required by Schuchert and Bailey Willis,
easier to account for if we regard the continental masses as being closer
ether when these bridges existed, and the consequent foundering of such
dges would necessarily follow upon the stretching of the sial sheets as
masses drew farther apart. Again, some of the land bridges may have
n due to the local junctioning of irregular-shaped sial sheets moving in
osite directions from the polar regions. - Author's abstract.

2. MAGNETIC METHODS

(3003) POLAR CHARTS FOR INTERPRETING MAGNETIC ANOMALIES

By Sylvain J. Pirson

Am. Inst. Min. and Met. Eng., New York, Contribution 91-L, Geophysical
Prospecting, 1935, 13 pp.

The abstract of the paper published in Mining and Metallurgy, vol. 16,
347, 1935, p. 488, reads as follows:

> The method of interpretation of magnetic anomalies presented in this article is especially applicable to the study of regional and local disturbances of the earth magnetic field related to the basement topography. Different assumptions are made: Constancy of the magnetic susceptibility throughout the basement rock, negligibility of the magnetic susceptibility of sedimentary rocks with respect to that of the substratum, and uniform distribution of induced magnetic dipoles. Polar diagrams are given for interpreting two-dimentional as well as three-dimentional geologic features; they are suitable for calculating the depth from the surface and the shape of the disturbing bodies.

(3004) THE MAGNETIC FIELD OF A FINITE CIRCULAR CYLINDER HOMOGENEOUSLY MAGNETIZED PARALLEL TO ITS AXIS (IN RUSSIAN)

By A. Sloutchanovsky

ansactions of the Central Geophysical Observatory, Leningrad, vol. 1,
no. 3, 1934, pp. 5-23

The present paper supplies a series of formulas, fundamental as well
auxiliary, for a computation of the components of the magnetic field of

a finite circular cylinder homogeneously magnetized parallel to its axis.

Numerical computations are carried cut according to the above-mentioned formulas sufficiently developed for this purpose. An essentially new result in the combination of the obtained formulas is presented by the expression of the integral of the form

$$\int^{\infty} e^{-\alpha x} I_0(\beta x) I_1(\gamma x) dx$$

(where I_0 and I_1 are the Bessel's functions of the zero and first orders) through full elliptic Legendre integrals of the third order. - Author's abstract.

(3005) ON THE VARIATION OF THE ELEMENTS OF TERRESTRIAL MAGNETISM WITH THE HEIGHT (IN RUSSIAN)

By N. Malkin

Transactions of the Central Geophysical Observatory, Leningrad, vol. 1, no. 3, 1935, pp. 24-27

The author makes an attempt to solve the important problem of determining the magnetic field of an altitude above the region of anomalies. Two methods are proposed:

1. The first presents an approximate solution of Dirichle's problem for a semispace (formulas are developed).

2. The second method of applying Taylor's series proves convenient when the magnetic field is to be determined at moderate heights.

A description of an integrator for a mechanical solution of the problem is given in the last part of the article. - Author's abstract.

(3006) ON THE APPLICATION OF NEUMANN'S PROBLEM TO THE INVESTIGATION OF MAGNETIC FIELDS AT ALTITUDES LYING ABOVE THE REGIONS OF ANOMALIES (IN RUSSIAN)

By N. Malkin

Transactions of the Central Geophysical Observatory, Leningrad, vol. 1, no. 3, 1935, pp. 28-43

The question treated already in the preceding note is considered by author by using formulas giving the solution of Neumann's problem for a semispace. Graphical methods of the solution of this problem are demonstrated.

Formulas of approximation, as well as a precise formula, are given for the case of a magnetic ridge. These formulas are applied with respect to

Kursk anomaly. In conclusion, a differential method taken as a first roximation of the integral method is considered; a graph convenient for putations according to this method is added. - Author's abstract.

07) ON THE MAGNETIZATION OF ISOTROPIC AND HOMOGENEOUS BODIES (IN RUSSIAN)

By A. Slouchanovsky

Transactions of the Central Geophysical Observatory, Leningrad, vol. 1, no. 3, 1935, pp. 44-63

The present paper gives a solution of the problem of magnetization of isotropic and homogeneous body with positive magnetic susceptibility, ited by Liapounoff's surface and placed in any field, constant with time, possessing a potential. The solution is found by means of the method successive approximations. - Author's abstract.

3. SEISMIC METHODS

(3008) GEOPHYSICAL SURVEY BY SEISMIC REFLECTION

By Edmund O. Sawyer, Jr.

Petroleum World, Los Angeles, Annual Review, 1935, pp. 197-208

A summary of geophysical survey based on information obtained from jor companies operating both in California and the Mid-Continent, and also the data from geophysical survey companies that undertake to survey areas a contract basis, is given.

Seismic reflection method is considered. Description is given under following headings: (1) Survey personnel; (2) Procedure in new areas;) Locating a fault; (4) Best results in level areas; (5) Eliminating ound roll; (6) Records extremely sensitive; (7) Discoveries made by geoysics; (8) Mid-Continent practice; (9) Refraction method on wane; and) Results justify cost.

Nine figures illustrate the article. - W. Ayvazoglou.

(3009) NOUVEAUX PRINCIPES DE CONSTRUCTION DES SÉISMOGRAPHES ÉLECTROMAGNÉTIQUES

(NEW PRINCIPLES OF CONSTRUCTION IN ELECTROMAGNETIC SEISMOGRAPHS)

By J. Coulcmb and G. Grenet

Annales de Physique, Paris, vol. 11, no. 3, April 1935, pp. 321-369

After a general outline of various types of electromagnetic seismographs ed at the present time (Galitzin, Wenner, Benioff), the authors indicate new principles on which some modifications of the seismographs may be based. The possibility of obtaining an exact equivalent of Galitzin's apparatus by using a pendulum and galvanometer of different periods is proved. The modifications of Wenner's apparatus are examined.

Finally the authors show how the constants of an apparatus may be determined, the amplification remaining constant for a great variety of periods. - W. Ayvazoglou.

(3010) DEBUT DES ONDES DE LOVE ET DE RAYLEIGH

(THE ORIGIN OF LOVE WAVES AND RAYLEIGH WAVES)

By J. Coulomb

Extract from the "Livre jubilaire de Marcel Brillouen (Paris, Gauthier-Villars), 12 pp.

A theoretical study on the propagation and origin of Love waves and Rayleigh waves under conditions neglecting the gravitational forces and the curvature of the earth's surface and treating the ground as an elastic isotropic medium is given. The article concludes with the interpretation of the results. - W. Ayvazoglou.

(3011) PROPAGATION OF LOVE WAVES OVER A SEMI-INFINITE SOLID BODY OF VARYING ELASTICITY

By S. Sakuraba

Geophysical Magazine, Tokyo, vol. 9, September 1935, pp. 211-214

On the assumption that the displacement perpendicular to the free surface and the dilatation are both zero, and the rigidity, μ , is related to the depth, z, by $\mu = \mu_0 (1+\sigma z)^2$, σ being a positive quantity, the case is first considered of a surface wave along a semi-infinite surface boundary, of which the upper side is closely connected with a rigid body. Thence the condition necessary for the existence of Love waves (characterized by an infinitely large number of nodal planes) over a semi-infinite solid body of varying elasticity is deduced. C.A.S., Science Abs., vol. 38, no. 455, 1935.

(3012) A LINEAR STRAIN SEISMOGRAPH

By Hugo Benioff

Bulletin of the Seismological Society of America, Berkeley, vol. 25, no. 4, 1935, pp. 283-309

In contrast to the usual forms of seismographs, based upon the relative motion of a pendulum and the moving ground to which its supporting structure is fastened, the strain seismograph is a nonpendular instrument. It does

t respond directly to vibratory movements. Its operation depends upon
riations in the distance between two points of the ground. Such variations
linear strains are set up by seismic waves. The description of the seis-
graph is given in this article under the following headings: (1) Earlier
rms; (2) Construction; (3) Electromechanical transducer; (4) Theoretical
havior of the rod; (5) Theory of the horizontal linear strain seismometer;
) Vertical component strain seismograph; (7) Three-component strain
ismograph; (8) Dilatation seismograph; and (9) Theory of the dilatation
ismograph. The theory of the undamped rod is given in the appendix. -
Ayvazoglou.

(3013) A FIRST APPROXIMATION FOR DEEP-FOCUS SEISMOGRAMS

By F. W. Sohon

lletin of the Seismological Society of America, Berkeley, vol. 25, no. 4,
1935, pp. 311-312

The author suggests that ordinary travel-time curves might be used for
ep-focus earthquakes if $\frac{1}{2}$ (P + pP) were taken instead of P and if $\frac{1}{2}$(S + sS)
ere taken for S. In order to see how close this approximation may be, a
ble computed from Wadati's travel times as published in Geophysical Magazine
ol. 7, no. 1, pp. 280-281, 285, and 288) is given. On the basis of Wadati's
gures, the method apparently gives an excellent first approximation.

A chart, with the pP-P interval as abscissa and the epicentral distance
ordinate, from which a rough value of the focal depth may be obtained, is
ven. - W. Ayvazoglou.

(3014) A STUDY OF A WELL GAUGE AS A SEISMOGRAPH

By F. B. Blanchard and Perry Byerly

lletin of the Seismological Society of America, Berkeley, vol. 25, no. 4,
1935, pp. 313-321

The authors investigated the possibilities of utilizing the water sur-
ace of deep wells as a seismograph. The primary problem consisted of con-
tructing an instrument with a suitable scale, sensitive enough to record
inute fluctuations, and to install it on a well susceptible to earthquake
ovements. A brief description of such apparatus called a "phreatic seismo-
raph" is given, and the records observed are shown in a table. The theory
the "phreatic seismograph" is discussed. - W. Ayvazoglou.

(3015) ON A STUDY OF MICROSEISMS RECORDED AT SITKA, ALASKA, DURING THE PERIOD FROM JAN. 1, 1929, TO DEC. 31, 1931, INCLUSIVE

By Donald C. Bradford

Bulletin of the Seismological Society of America, Berkeley, vol. 25, no. 4, 1935, pp. 323-342

The author divides the theories formulated by various authors with regard to the causes of the several types of microseisms into the following three groups. (1) The surf theory; (2) the Banerji theory, wave motion on the sea surface is propagated to the sea floor as a time variation of load; (3) the Gherzi theory, which deals with the idea of an oscillating atmosphere, which, in turn, will affect the ground, producing oscillatory motion in the upper layers of the earth's crust.

The main points of these theories are discussed.

Bradford sums up his reasons for a conclusion in favor of the atmospheric pumping hypothesis of the cause of microseisms, as follows:

1. Low correlation coefficient between surf and microseisms at Sitka (0.27).

2. High correlation coefficient between microseisms and the existence and movements of cyclones at Sitka (0.80).

3. The correlation of atmospheric pumping in the storm of August 23, 1933, with microseisms recorded at Saint Louis.

4. The results of the investigation by Shida of the periods of oscillation of the atmosphere at Tokyo.

5. Various other minor points outlined in the paper. Further study is required, however, to solve this problem conclusively. - W. Ayvazoglou.

(3016) A REVIEW OF OUTSTANDING PROBLEMS IN STRONG-MOTION VIBRATION WORK

By N. H. Heck

Bulletin of the Seismological Society of America, Berkeley, vol. 25, no. 4, 1935, pp. 343-347

According to the author, this paper may serve to outline and discuss problems in strong-motion work and to indicate the relation of the work of the Coast and Geodetic Survey to some of them. Questions are raised under the following headings: (1) The relation between teleseismic and strong-motion observations; (2) the relation between the study of nearby light to moderate earthquakes and that of strong motions; (3) the difference in position between epicenter and place of maximum damage; (4) the response of

smographs to ground motion; (5) the response of buildings and other
uctures to ground motions; (6) the response of the ground to earth motions;
the resonance of structures; (8) the significance of long-period waves
the central region of a strong earthquake; (9) the recording of a
or earthquake; (10) surface displacements of the ground; (11) additional
es of observation; and (12) the future of the program - W. Ayvazoglou.

(3017) A PROGRESS REPORT OF THE CALIFORNIA SEISMOLOGICAL PROGRAM OF THE COAST AND GEODETIC SURVEY

By Franklin P. Ulrich

letin of the American Society of America, Berkeley, vol. 25, no. 4, 1935,
pp. 349-359

This paper contains a brief progress report of the various projects
rried on in the past year, such as operation of the strong-motion instru-
ts; experimental and preliminary vibration work; dominant ground-period
estigation; investigation of damage by the Long Beach earthquake; in-
rument development; vibrating machine; tiltmeters; questionnaire work,
- W. Ayvazoglou.

018) A MACHINE FOR SETTING STRUCTURES AND GROUND INTO FORCED VIBRATION

By John A. Blume

letin of the Seismological Society of America, Berkeley, vol. 25, no. 4,
1935, pp. 361-379

A brief description of the machine is given and the results obtained
e presented.

The vibrator consists essentially of three steel wheels, each 30 inches
diameter, to which are bolted lead plates in order to produce "unbalance."
e forces developed by the machine are directly proportional to the amount
this unbalance. The vibrator was made as small and light as possible.
s dimensions are as follows: Height, 48 inches, length, 34 inches, width,
inches. It weighs about 340 pounds, depending upon the amount of unbal-
ce attached to the wheels. A diagram of vibrator wheels and a general
ew of the vibrator are given in pictures. In the following the author de-
ribes (1) the test procedure and (2) tests made with the vibrator in a
mber of structures. Ground-shaking experiments have been conducted at the
sadena Seismological Laboratory, at the site of the new Francisco Mint,
d on soft ground at the Mare Island Navy Yard.

The author concludes that although the vibrator is an experimental
chine, it is believed that it will be successful, especially with reference
the analysis of building vibrations. It has been tried for many diversi-
ed tasks, yet records showing forced vibration have been obtained in every
st. - W. Ayvazoglou.

(3019) BUILDING VIBRATIONS

By Neil R. Sparks

Bulletin of the Seismological Society of America, Berkeley, vol. 25, no. 4, 1935, pp. 381-386

Data on vibrations of a series of buildings, obtained from the research conducted by the U.S. Coast and Geodetic Survey in the San Francisco Bay region and in Los Angeles, are given with the purpose of getting information that would be useful in improving the design of buildings in earthquake regions. - W. Ayvazoglou.

(3020) VELOCITIES OF ELASTIC WAVES IN ROCKS OF VARIOUS AGES AND AT VARIOUS DEPTHS

By B. Gutenberg

Pacific Section (American Association of Petroleum Geologists), paper presented at meeting of November 7 and 8, 1935

The abstract of this paper, published in Bull. Am. Assoc. Petrol. Geol., vol. 19, no. 12, 1935, p. 1842, reads as follows:

> The velocity of elastic waves in rocks increases with the age of the rocks and their depth. In the case of very old rocks the effect of depth is small; the velocity of the elastic waves in young layers depends more on the depth at which they are than on the age. Consequences of these results as to seismic prospecting and as to theoretical problems are discussed.

(3021) EXPLORING WITH EXPLOSIVES

By C. A. Heiland

The Explosives Engineer, Wilmington, vol. 13, no. 12, 1935, pp. 359-271 and 379

In this detailed article, Heiland describes the development and application of the seismic methods of geophysical prospecting.

Texas and Louisiana Gulf Coast Statistics, 1924-1934, are represented by curves showing (1) the annual oil production of the Gulf coast of Texas and Louisiana, (2) the annual production from discoveries made by geophysical methods, and (3) the annual cost of geophysical operations.

Chapters of the article are 1. Principles of refraction and reflection shooting. 2. History of refraction and reflection prospecting. 3. Principles of refraction shooting. 4. Procedure in refraction shooting; instruments. 5. Examples of refraction prospecting. 6. Principles of reflectio ospecting. 7. Reflection procedure and instruments. 8. Examples of re-ection shooting. 9. Cost of refraction and reflection work. 10. Statis-cs. A graphical summary of the results obtained on the Texas-Louisiana ast from 1924 to 1934 with all geophysical methods, contrasted with the mber of discoveries resulting from geological surface methods from 1893-23, is presented.

The article is illustrated by 18 figures. - W. Ayvazoglou.

4. ELECTRICAL METHODS

(3022) ELECTRICAL CORING THROUGH CASING ACCOMPLISHED WITH NEW DEVICE

Editorial Note

Petroleum World, Los Angeles, vol. 32, no. 11, 1935, p. 196

A new device invented by George H. Ennis, the Stratagraph, designed to orrelate underground strata through casing, is described briefly.

The device consists of an electrode that is lowered into the cased hole, combination of external circuits, and a recording instrument for measuring ich electrical variations as may take place in these circuits.

The method, it is said, has been checked and rechecked against both echanical and electrical cored logs. - W. Ayvazoglou.

(3023) DIELECTRIC CONSTANTS AND SPECIFIC RESISTANCE OF ROCKS

By B. Dostovalov

omptes Rendus de l'Académie des Sciences, U.S.S.R., vol. 3, no. 2, 1935,
pp. 87-90

The rock specimen, a rectangular plate, is inserted between the plates f a condenser in a tuned circuit coupled to a valve oscillator giving fre-uencies between 6×10^5 to 2×10^6 . From the change in capacity of a tandard condenser necessary to restore resonance after the introduction of he specimen, and the ratio of the currents in the circuit at resonance, he dielectric constant and the resistivity of the specimen are determined. n all cases dry rocks were used, the dielectric constant varied from 4 to 0, and the resistivities were of the order of 10^6 ohm-cm. The results did ot show any relation between the measured values and the chemical composi-ion of the rocks, but the texture seems to influence the dielectric con-tant. J. M. B., Science Abs., vol. 38, no. 455, 1935.

(3024) THE SWEDISH GEOELECTRICAL PROSPECTING METHODS (IN SERBIAN)

By V. A. Gorsky

Rudarski i Topionicki Vesnik, Belgrad, vol. 7, no. 9, 1935, pp. 3-27

After a short introduction on the important rôle Sweden has played in the development of practical geophysics, especially of the magnetic and electrical methods, the improvements of the Swedish geoelectrical methods after the World War are described. Since 1924 these methods were used to a large extent by the Aktienbolaget Elektrisk Malmletning of Stockholm. A review of the application of these methods throughout the world is given.

Geophysical prospecting carried out by Government institutions, geophysical departments of private companies, consulting geophysicists, and others, is discussed, and the conclusion is drawn that the experience obtained by large private companies, such as the above mentioned Swedish company, is usually of great advantage.

The principles of the geoelectrical methods of prospecting, their classification, figures of the resistivity of rocks and water, and the use of alternating and direct currents are given. The resistivity method is briefly discussed. Theoretical and mathematical principles of the potential method are dealt with in detail. The theory of "electrical coring" (electrical drilling) is explained, and a description of the methods of surveying for gold-bearing quartz veins and other nonconducting ores is given.

Principles and mathematical theory of inductive methods, diagrams applied in practice, and surveying methods are investigated with reference to examples.

Finally, examples of geoelectrical work carried out by the A. B. Electrisk Malmletning in various parts of the world are examined.

Fifty-one figures illustrate the article, and a list of literature on Swedish geoelectrical methods of prospecting is added. - Author's abstract.

(3025) GEOPHYSICAL ELECTRICAL PROSPECTING AND EVALUATION OF PRODUCTIVITY OF LAYERS (IN RUSSIAN)

By A. Kagan

Azerbaijanskoe Neftianoe Khoziaystvo, Baku, no. 11-12, 1933, pp. 20-25

The geophysical electrical coring method is analyzed and it is concluded that:

1. Layers with a low specific resistance, that is, with a water horizon, are marked on the resistance diagram by an almost constant figure, which is close to the specific resistance of the layer. In these layers, the diameter of the borehole as well as the specific resistance of the drilling solution can be disregarded.

2. When investigating layers of high resistance, these factors are of ieciding importance, and a simple comparison of the resistance diagrams for re holes of various diameters and with various drilling solutions may lead great errors.

3. When calculating the specific resistance of the mineral by the V. A. ch method, the influence of the basic column of the drilling solution may disregarded; and in the case of a number of layers a diagram may be obined, which will reflect the physical properties of the layer to a much tter extent than a simple specific resistance diagram. However, an increase the diameter of the conducting column, because of the penetration of the illing solution into the layer, will be shown in the diagram; and therefore, the case of highly resistant layers, this as well as the ordinary resisnce diagrams will not show the difference in the specific resistance of e minerals but the difference in the pressures, penetration, etc.

4. Since the apparent resistance depends also on the ratio of the ickness of the layer to the size of the prospecting installation, changes the latter, when working with boreholes of various diameters, will be reected in the resistance diagrams, interfering with their comparison.

5. Therefore, when referring to the diagram it is essential that tables r the equation characterizing the ratio of the specific resistance of the rrounding medium to that of the specific resistance of the column with the illing solution be provided for the most popular apparatus and for all dieters of the boreholes to be investigated, or, since it is difficult to ovide these tables, curves may be substituted.

6. It is necessary to investigate specific resistance of various mud lutions and their influence on the pressure, temperature, etc., on this ecific resistance. The specific resistance of the mud solution should be termined with the greatest care before each prospecting investigation.

7. The aforesaid explains the unsteadiness of the upper limits of the sistance, and this may give some indications for the best location of reholes to be drilled. A literature index containing 11 references is pended. - Jour. Inst. Petrol. Technol., vol. 21, no. 145, 1935.

5. RADIOACTIVE METHODS

026) RADIOACTIVITY OF FERRO-MANGANESE FORMATIONS IN SEAS AND LAKES OF THE U.S.S.R.

By L. M. Kurbatov

Nature, London, vol. 136, no. 3448, 1935, p. 871

The radioactivity of ferromanganese compounds obtained from seas and akes of the U.S.S.R. is shown in a table (depths in meters, name of sea or ake, radium content).

A more detailed table containing the coordinates and other data, as well as the characteristics of the samples, will be given in a special paper. The percentage and the relative proportions of radium, mesothorium, I , and thorium, X , in the separate layers of the concretions may give an estimate of the rate at which such concretions are formed. - W. Ayvazoglou.

(3027) RADIOACTIVITY OF OIL-WATERS IN CZECHOSLOVAKIA

By F. Běhounek, V. Santholzer, and F. Ulrich

Nature, London, vol. 136, no. 3449, 1935, pp. 910-911

The authors discuss the content of radium and mesothorium of the brine of the Russian oil districts. The highest content of radium found is 7.25×10^{-10} in one liter of water, from a depth of 262 meters. No distinct correlation between the depth of the horizon and the radioactivity of the corresponding oil-water could be established; even from the greatest depths, activities of the order of 10^{-12} were established. Waters from various borings at Jasina (Czechoslovakia) were examined with regard to their radioactivity. It was established that the content of radium elements is much lower in the oil-waters of Czechoslovakia than in those of Russia. - W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(3028) GEOPHYSICISTS BUSY; 23 CREWS WORKING AREA ADJACENT TO RODESSA

Editorial note

Oil Weekly, Houston, vol. 79, no. 11, 1935, pp. 81-82

Twenty-three geophysical parties working in North Louisiana, South Arkansas, and East Texas as border counties are concentrating their work on the Sabine Uplift and around its flanks.

Two factors have caused the influx of geophysical parties; one is the discovery of oil at Rodessa and the other is the fact that lack of sufficient deep-well data from drilling prevented geologists from mapping the lower structure accurately.

Magnetic and seismic surveys are being carried on. - W. Ayvazoglou.

(3029) GEOPHYSICS AIDS ROADBUILDERS

Editorial note

Compressed Air Magazine, New York, vol. 40, no. 8, 1935, p. 4812

The results following numerous tests made by various State highway departments and the U.S. Bureau of Public Roads indicate that two types of

physical investigation are effective for determining the character of
erground materials - the resistivity method and the seismic method.

According to this note, the seismic method offers a direct means of
suring rigidity, which is the property that most interests the highway
ineer. The resistivity method is more suitable for distinguishing be-
en the kinds of soft material, such as sand and clay. - W. Ayvazoglou.

(3030) WEST WITWATERSRAND AREAS, LTD.

Editorial note

th African Mining and Engineering Journal, Johannesburg, vol. 46, no.2229,
1935, pp. 201-203

This note refers to the annual report to June 30, 1935, of the consulting
ineer of West Witwatersrand area, in which the results of the knowledge
ned in respect to the company's area are discussed. Geophysical explora-
n was conducted on the following lines: Magnetometric survey was con-
trated upon in both the eastern and western sections, involving 35,000
netometric observations, representing 435 miles of traverse. The seismic
hod of prospecting has been investigated, and preliminary experiments in-
ate that the method had distinct possibilities of roughly determining
thicknesses of beds overlying the Witwatersrand system. Records estab-
hing the velocities of elastic waves in the uppermost weathered layers
the dolomite were completed.

A new system of electrical resistivity surveying has been evolved
dually with the object of investigating water horizons. According to the
ort, the year's operations can be regarded as extremely satisfactory, and
coordinated results achieved from the magnetometric and electrical sur-
s, together with the information gained from the intensive drilling pro-
m, are of considerable assistance in determining the position of future
ehole sites. - W. Ayvazoglou.

(3031) ON THE POSSIBILITY OF APPLYING GEOPHYSICAL METHODS IN PROSPECTING FOR RAW CEMENT (IN RUSSIAN)

By D. D. Tenner and S. Liogonky

Razvedka Nedr, Moscow, no. 19, 1935, pp. 39-41

The possibility of discovering limestone-cement deposits by geophysical
thods is discussed. The application of seismic methods and especially of
ctrical methods was found to be of great value in determining the thick-
ss of the overburden. The authors describe several cases in which cement
posits covered by overburden of from 2 to 10 meters were disclosed by
ctrical methods of prospecting. The accuracy obtained was 1 to 3 meters.
V. Ayvazoglou.

(3032) GEOPHYSICISTS MEETING HELD IN DALLAS

Editorial note

Oil and Gas Journal, Tulsa, vol. 34, no. 29, 1935, p. 52

A one-day session was held by the Society of Petroleum-Geophysicists in November 1935, in Dallas. The following papers were presented: 1. A review of discoveries in the Gulf coast, by E. E. Rosaire. 2. Influence of geological factors on longitudinal seismic velocities, by L. Y. Faust. 3. Seismic computations assuming velocity an integrable function of depth, with an application by M. M. Slotnick. 4. The economic utility of thermometric measurements in drill holes in connection with drilling and cementing problems, by E. G. Leonardon. 5. The use of multiple-shot holes and multiple geophones in geophysical work, by W. T. Born. 6. Earth sides and their measurements, by R. D. Wyckoff. 7. The amplitude and character of refraction waves and the screening effect of salt domes, by A. Wolf. 8. Geophysics and discovery of the Tomball oil field in Harris County, Tex., by J. B. Eby. 9. The place of the vertical gradient in gravitational interpretation, by H. M. Evjen. 10. The identification of reflection from base of the Mississippian limestone, by G. H. Westby.

The considerable increase in geophysical activities in 1935 in the Gulf coast counties in Texas was indicated, and geophysical surveys were credited with the discovery of 13 pools in that district. Eleven geophysical parties worked in South Texas all year.

The numbers of geophysical crews working in California, Colorado, East Texas, Oklahoma, Kansas, Mississippi, and Alabama were mentioned. - W. Ayvazoglou

(3033) SCIENTIFIC METHODS OF EXPLORATION FOR OIL HELP INDUSTRY MEETS ITS DEMANDS

Editorial note

Oil and Gas Journal, Tulsa. vol. 34, no. 31, 1935, pp. 13-14

In a brief historical outline the author indicates the importance of geological and geophysical prospecting work in discovering new oil fields.

The volume of geophysical exploration being done during the last two years is given in the following table:

1934		1935	
Crew months	Expenditures	Crew months	Expenditures
120	$ 60,000	161	$ 80,000
540	720,000	390	507,000
84	420,000	48	240,000
36	72,000	50	100,000
1,110	9,990,000	1,710	15,390,000
	$11,262,000		$16,317,000

The figures show that in order to meet its demands the oil industry has pted geophysical methods of prospecting to a very large extent. - W. azoglou.

(3034) METODOS GEOFISICAS DE PROSPECCION

(GEOPHYSICAL METHODS OF PROSPECTING)

By Pedro C. Sanchez

demia Nacional de Ciencias "Antonio Alzate", Mexico, vol. 53, no. 4,
1934, pp. 101-133

A description of geophysical methods of prospecting is given under the lowing headings:

1. Classification of geophysical methods according to C. A. Heiland.
2. Gravimetrical methods: Pendulum, torsion balance, improvements and application of the torsion balance.
3. Magnetic methods.
4. Radioactive methods.
5. Geothermal methods.
6. Seismic methods.
7. Electrical methods.
8. Conclusions concerning the application of each method.
9. Depth that can be attained by various methods.
10. Cost of geophysical prospecting.

W. Ayvazoglou.

(3035) GEOPHYSICAL MAPPING FROM THE AIR

By C. A. Heiland

gineering and Mining Journal, New York, vol. 136, no. 12, 1935, pp. 609-610

In this article Heiland reviews briefly the aerial geophysical mapping e so far and discusses the possibilities of aerial mapping in various elds of geophysics under the following headings: 1. The first attempt. An advantage. 3. Some aerial observations. 4. Early work in electri- -prospecting. 5. The outlook.

He concludes that although there are difficulties to be overcome in rial geophysical mapping, such as low flying and elimination of horizon- and vertical accelerations, an attempt to overcome these difficulties l be rewarded by the following advantages: Ability to survey areas in- essible to any other methods, reduction of terrain and surface-geology ects, elimination of disturbances due to industrial electricity and gnetism, and improvements in interpretation methods by flying the same verse in different altitudes. - W. Ayvazoglou.

(3036) NEW APPLIED GEOPHYSICS

By A. Belluigi

Oil Weekly, Houston, vol. 78, no. 9, 1935, p. 47

The author discusses briefly the various dynamical physical methods tha have been used by prospectors for the direct detection of useful minerals underground, including petroleum. - L.V.W.C., Jour. Inst. Petrol. Technol., vol. 21, no. 144, 1935.

9. NEW BOOKS

3037) La Revue pétrolifère, no. 660, Dec. 7, 1935, 23 Rue de Constantinople, Paris. This number is devoted almost entirely to geophysics (pp. 1559-1613). It contains the following articles: 1. Works of the Schlumberger brothers in the domain of geophysics; 2. Note on history of geophysics (magnetism, electrical methods, gravimetry, seismic methods). 3. History of Schlumberger's group. 4. Considerations on geophysics (actual state of geophysics, gravimetry, magnetometry, seismic prospecting, electrical prospecting, future of geophysics, geophysics from the economic viewpoint). 5. Electrical exploration of wells (electrical exploration of wells, electrical resistivities of rocks, measurement of electrical resistivities inside of wells, spontaneous currents inside of the wells, measurement of spontaneous potentials in the wells, material used, application of electrical diagrams). 6. Geophysical methods of prospecting (statical methods, electrical methods, theory of the resistivity method, application of the resistivity method for prospecting in the saliferous basin of Alsace, application of the resistivity method in the region of Baku, U.S.S.R., seismic methods). 7. Geophysics in the world (North America, U.S.S.R., France, North Africa, Rumania, other countries). 8. Geophysics at the International Congress of Mining, Metallurgy, and Applied Geology. 9. International Mining Congress (Geophysics in general, electrical coring).

The articles are illustrated by a great number of maps, diagrams, and photographs.

3038) Oltay, K. Relative Schwerkraftmessungen zwischen Budapest und Padova. (Relative gravity measurements between Budapest and Padua.) Vol. 4 of the Mitteilungen des ungarischen geodätischen Instituts, Budapest, 1934, 70 pp., 8 figs. The results of the relative gravity measurements carried out in 1933 between Budapest and Padua are given.

3039) Turner, H. Cobden, and Banner, E.H.W. Electrical measurements in principle and practice. 354 pp., illustrations, tables. Instruments Publishing Co., Pittsburgh, 1935. Price, $4.50. A glossary of terms used in instrument and measurement is added.

10. PATENTS

(3040) METHOD OF DETERMINING SLOPE OF SUBSURFACE ROCK BEDS

William G. Green, Tulsa, Okla.

U. S. Patent 2024921 Issued Dec. 17, 1935

This invention relates to the method of profiling a subsurface formation, including detonating an explosive charge at one point; recording the reflectio of sound waves set up by the detonation and reflected from said formation at a series of spaced detecting points; advancing such series of detecting points in definite relation to the first series of detecting points, so that the firs one of the detecting points of the second series is common to a detecting poin of the first series; detonating a second explosive charge at said first point of detonation; recording the sound waves set up by the second detonation and reflected from said formation to said second series of detecting points; and correlating said records relatively to recordings from said common detecting points, wherefrom a continuous profile of said formation is determined.

Claims allowed - 8

(3041) PENDULE ÉLASTIQUE PERFECTIONNÉ, DESTINÉ NOTAMMENT À LA MESURE DE L'INTENSITÉ DE LA PESANTEUR

(IMPROVED ELASTIC PENDULUM ASSIGNED ESPECIALLY FOR MEASURING THE INTENSITY OF GRAVITY)

Fernand Holweck of France

French Patent 776280 Issued Jan. 22, 1935

This invention relates to an elastic blade, characterized mainly by the form of the blade, which consists of (a) a central reference surface; (b) a base-groove with parallel surfaces; and (c) a fixing mandrel of the pendulum rod with a metal V-ring, the ensemble being arranged in such a way that the center of gravity is placed in the reference surface.

Claims allowed - 13

(3042) PERFECTIONNEMENTS AUX MODES ET APPAREILS DE MESURE DE DIFFERENCES DE POTENTIEL

(IMPROVEMENTS IN METHODS AND APPARATUS FOR MEASURING THE DIFFERENCES OF POTENTIAL)

Companie Générale de Géophysique of France (Seine)

rench Patent 777945 Issued Mar. 5, 1935

This invention relates to a method consisting mainly of compensating he inequalities of the resistances of the electrode contacts or of the roup of electrodes by an apparatus assigned for measuring the differences f the potential in the ground.

Claims allowed - 1

(3043) PROCÉDÉ PERMETTANT DE DÉCALER LA PRÉSENCE DE CERTAINS CORPS DANS LE SOL OU AILLEURS, ET D'ÉTUDIER LEURS PROPRIÉTÉS

(METHOD FOR DISCLOSING THE PRESENCE OF CERTAIN BODIES IN THE GROUND OR ELSEWHERE AND FOR STUDYING THEIR PROPERTIES)

Louis Turenne of France

rench Patent 45540/704353 Issued Sept. 12, 1935

This is an additional patent to 704353, issued May 19, 1931 (see eophys. Abs. 42 and 67).

The invention relates to an apparatus by which five kinds of waves mitted by a magnet placed in the N-S direction may be distinguished. The pparatus is characterized by a special device transmitting electromagnetic aves.

Claims allowed - 3

(3044) BALANCE DE TORSION

(TORSION BALANCE)

Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij of Netherlands

rench Patent 778421 Issued Mar. 15, 1935

This invention relates to torsion balance of the Ëotvös type, in which the orizontal distance between the masses is very small, so that the bar may be odged in a simple cylindrical cover. Arrangements are made for preventing egistration of microseismic terrestrial vibrations.

Claims allowed - 7

(3045) PROCÉDÉ ET DISPOSITIF POUR DETERMINER LE NIVEAU SUPERIEUR ATTEINT PAR LA CIMENTATION DU TUBAGE D'UN SONDAGE

(METHOD AND APPARATUS FOR DETERMINING THE UPPER LEVEL REACHED BY THE CEMENTATION OF THE TUBING OF A WELL)

Société de Prospection Électrique (Procédés Schlumberger) of France (Seine)

French Patent 783824 Issued July 18, 1935

This invention relates to the method of determining the upper level reached by the cementation of the tubing of a well; it consists mainly in making temperature measurements along the whole well and to disclose the sudden variation of temperature which is manifested at this level and to determine in this way the depth of this level. The temperature measurements are made by an electrical resistance thermometer.

Claims allowed - 2

(3046) PROCÉDÉ ET APPAREILLAGE POUR LA RECONNAISSANCE DES TERRAINS TRAVERSÉS PAR UN SONDAGE

(METHOD AND APPARATUS FOR DETERMINING THE STRUCTURE OF THE GROUND PENETRATED BY DRILLING)

Société de Prospection Électrique (Procédés Schlumberger) of France (Seine)

French Patent 786863 Issued Sept. 11, 1935

This invention relates to the method of determining the structure of the ground penetrated by drilling; it consists of determining, at various depths of the nontubed part of the well, the velocity of propagation of the sound in the ground forming the wall of the well. This determination is made by loweri into the well one transmitter and two sound receivers and by measuring the phase difference that exists between the sound vibrations produced by the transmitter and transferred through the ground to the two sound receivers.

Claims allowed - 1

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DEPARTMENT OF THE INTERIOR
UNITED STATES BUREAU OF MINES
John W. Finch, Director
March 1936.

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GEOPHYSICAL ABSTRACTS
MINING DIVISION

ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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1. GRAVITATIONAL METHODS

(3047) MESSUNGEN MIT DEM NEUEN STATISCHEN SCHWEREMESSER DES GEODÄTISCHEN INSTITUTS

(MEASUREMENTS WITH THE NEW STATICAL GRAVIMETER OF THE GEODETIC INSTITUTE)

By H. Haalck

Öl und Kohle, Berlin, vol. 11, no. 43, 1935, pp. 851-853

A brief description of Haalok's new field statical gravimeter is given. consists essentially in the arrangement of the reading devices at the opposite sides of the instrument in such a way that two observers can work at the same time. The height of the instrument is 125 cm., the diameter 62 cm., and the weight 25 to 30 kg. The apparatus is surrounded by ice during the whole time measurements. The operation of the apparatus is explained.

The daily productivity depends mainly on the facilities of transportation as it takes about only 8 minutes per each measurement.

The calculating work is simple, as the mean values of the readings are only to be multiplied by the scale value. All other reductions (concerning th height and geographic latitude) are taken from the tables.

The accuracy of the apparatus is about ± 1 mgal. Several measurement pro files are given as examples. The author shows also the possibility of the application of this instrument for detailed measurements.--W. Ayvazoglou.

(3048) MASSENANZIEHUNG BEGRENZTER HOMOGENER KÖRPER VON RECHTECKIGEM QUERSCHNITT UND DES KREISZYLINDERS

(GRAVITATION OF LIMITED HOMOGENEOUS BODIES OF RECTANGULAR SECTION AND OF A CIRCULAR CYLINDER)

By E. A. Ansel

Beiträge zur Angewandten Geophysik, Leipzig, vol. 5, no. 3, 1935, pp. 263-29

Viewing gravity anomalies in the light of the assumptions employed as regards their origin, it seems noteworthy that a check-up by computing the effec of the assumed disturbing mass, the features of which are supposed to be known has not been sufficiently tried in cases where it could have been done. When it has to be decided whether a set of local or regional gravity anomalies, defining the disturbance sufficiently, can be ascribed to a certain structural defect within the crust, it is always useful to compare the actual anomalies with the computed effect of the assumed structure, and this comparison should not be restricted to the values in a single point only.

In so far as gravity anomalies are linked with submerged ridges or troughs
a density different to that of the surrounding medium, the representation of
field caused by them becomes accessible by identifying the structure in
stion with a stratum of equal length, diameter, and thickness but of a rec-
gular cross section; all other properties remain unaltered. The problem to
ve consists in finding the attraction of an homogeneous parallelepipedon in
nts outside or on its own surface.

To facilitate the solution, the attracted point should be taken as origin
the axes of reference, each directed to one of the three pairs of parallel
es; in this rectangular system the axis of Z is supposed to follow the plumb
e in the direction towards the interior. The components of attraction are
ressed by the integrals and these may be integrated in a closed form. But
the purpose of evaluation, however, the integration, partly in closed form,
tly by means of infinite power series, is preferred. In this way the final
ressions result from the development. By adjusting the boundary limits
respondingly, the formulas permit application in a variety of cases of tec-
ic structures comprising all related forms from a block to an infinite plane
atum.

As an example, there is considered a case in which a gravity anomaly arose
m a trough caused by magmatic disintegration in the intermediate layer of
crust, which (according to Jeffreys) ranges in depth from 10 km. downward
30 km., having therefore a thickness of 20 km. The trough is supposed to
e been formed in such a manner that the density in the upper half decreased
the amount $-\Delta\rho$, while at the same time the density in the lower half, in-
easing by $+\Delta\rho$, was raised to the density of the layer below. The total mass
hin the trough remains unchanged during the process, but the gravity field
the earth's surface within the scope of the altered mass configuration
ergoes a change. It would show a negative anomaly above the trough with a
imum along the central line; from there the anomaly diminishes slowly at
st until the boundary plane through the side of the stratum is reached.
se to this point, a steep decline begins leading within a short distance of
zero value of Δg. Proceeding outward, a positive anomaly will be en-
ntered, with a maximum in a distance equal to half the diameter of the
ough. From then on the anomaly Δg decreases gradually towards zero, but a
rceptible effect exists still within a wide range. The same distribution of
avity anomalies, a low along an extended and comparatively narrow zone en-
rcled by a gravity high on either side, might, on the face of it, also be
counted for by assuming two deep-seated ridges with a trough in between as a
sult of a crustal warping. In that case, the mass will not be the same in
l parts of the affected region as before the warp, a fact that ought to per-
t discrimination between the field caused by a magmatic disintegration or by
warp.

The second part of this paper deals with the attration of a circular cylin-
r with reference to its geophysical counterpart - the salt dome. But, in
is instance the axial or Z component dominates in importance and is given
eference therefore in the development.

The attraction of a homogeneous cylinder in any point outside or on its surface is characterized by a radial and an axial component; the latter is expressed by the integral, which can be integrated by series. This now raises the question of convergence, from which results the subdivision into three separate cases with different solutions:

1. The distance of the attracted point from the center of the upper dis of the cylinder never becomes equal to or less than the radius of the disk.

2. When this condition is not fulfilled throughout, there exists always limiting radius dividing the cylinder into an inner part and a cylindrical shell surrounding it.

3. The attracted point is very close to or on the surface of the cylind The solutions are given to each of these cases; they may be adapted, also, to cases omitted here, as, for instance, when the distance of the attracted poin from the lower disk has also to be taken in account.

A graph illustrates the effect of a cylindrical salt dome in an otherwis normal gravity field; the depth of the upper disk below the surface was taken equal to the radius, the lower disk being four times as distant from the same plane.--Author's abstract.

(3049) DAS THYSSENGRAVIMETER

(THE THYSSEN GRAVIMETER)

By A. Schleusener

Beiträge zur Angewandten Geophysik, Leipzig, vol. 5, no. 3, 1935, pp. 303-314

Mean errors smaller than ± one milligal were established during the firs field measurements made with the Seismos Co. Thyssen gravimeter. Errors smaller than ±0.2 milligal are usually observed at the present time.

The influence of temperature on the adjustment of the Thyssen gravimeter is calculated to be only 0.6 milligal for each degree in temperature change. Corrections for changes in temperature or elastic after effects were not made in experiments and measurements described in this article.

In carrying out experimental measurements for the Governmental geophysical survey of Germany in the summer of 1934, 12 stations were repeated one week after the first measurements. A mean error of ±0.5 milligal was observe There were several pendulum stations in the region of the survey and thus many errors in measurements could be easily disclosed.

In checking the pendulum measurements carried out by the Seismos Co. in 1926 near the "Ricklinger Hoch" in Holstein, good conformity (with a few exceptions only) was found between the gravimeter measurements and the pendulum measurements. The superiority of the gravimeter, with a mean error equal

±0.7 milligal over the pendulum measurements, was proved during these first ional measurements of the terrain (more than 600 sq. km.).

In 1935, the average mean error of the measurements with the gravimeter ing the regional survey for the German Government was as low as ±0.3 to ±0.4 ligal. It was also proved that in taking measurements over deep salt domes h small deficiencies in gravity, the gravimeter may be used successfully tead of the torsion balance in places where the torsion balance does not k properly on account of irregularities in densities of the ground near the face.--Author's abstract translated by W. Ayvazoglou.

(3050) SOME CONCLUSIONS DRAWN IN CONNECTION WITH THE RESULTS OF GRAVIMETRICAL SURVEY OF THE RIGHT BANK OF LOWER VOLGA (IN RUSSIAN)

By A. N. Stepanov

Bulletin de la Société des Naturalistes de Moscow, Moscow Section of
Geology, vol. 12 (4), 1934, pp. 551-561

The results of gravimetrical survey carried out by torsion balance in 33 on the right bank of the lower Volga (region of Cherniy Iar) are described. series of maxima and minima of gravity was established by this survey. The cture obtained was very close to that which resulted from gravimetrical sur- ys carried out in the regions of Baskunchak and Emba. The zones of maxima d minima of gravity were disclosed by the survey with equal accuracy. Maxima gravity were sharply indicated and their forms were determined fully.

The author analyses the gravimetrical results based on the correlation of e gradient curve of the profile with the possible cases of geological struc- re.

From this analysis the hypothesis is drawn that the main cause of the ob- rved anomalies depends not only on the effect of the light salt masses but so on the effect of heavy old rocks. The following assumptions are made om this viewpoint:

1. The zones of the maxima of gravity correspond to the zones of ising of old heavy rocks (probably of the Paleozoic era);

2. The zones of the minima of gravity correspond to the zones of sinking these heavy rocks;

3. Salt domes may occur in these sinking-zones;

4. Salt formations may also not exist in these sinking-zones but the nima may still remain; in these cases the minima are less intensive.

The author considers the possibility of the existence of salt-structures in the sinking-zones based on the existence of salt layers in the region of Sterlitamak.

The author emphasizes that the explanation of the whole gravimetrical condition by the existence of one contact surface between the salt and the adjoining rocks is more or less unnatural. He is of the opinion that the existence of two contact surfaces is more probable.

He finally indicates that the maximum zones may be of interest from the viewpoint of oil flow and expresses the desire that drilling should be begun in the region investigated.--Author's abstract translated by W. Ayvazoglou.

(3051) SUR L'INTENSITÉ DE LA PESANTEUR EN ALGÉRIE, DANS LE MIDI DE LA FRANCE ET DANS L'ÎLE DE MAJORQUE

(THE INTENSITY OF GRAVITY IN ALGERIA, IN THE MIDI OF FRANCE, AND IN THE ISLAND OF MAJORKA)

By Jean Lagrula

Comptes Rendus, Académie des Sciences, Paris, vol. 201, no. 23, Dec. 2, 1935, pp. 1095-1097.

Measurements were made at 36 stations with the Holweck-Lejay pendulum no 43. The results are summarized in a table.--W. Ayvazoglou.

(3052) DAS ROHÖL UND DIE SCHWEREANOMALIEN IN DEN POLNISCHEN WESTKARPATHEN

(CRUDE OIL AND GRAVITY ANOMALIES IN THE POLISH WEST CARPATHIANS)

By Jan Nowak

Petroleum, Berlin, vol. 32, no. 1, 1936, pp. 9-10

The results of the gravity measurements carried out in the region of the West Carpathians are discussed.

A map of isoanomalies of the region is given, and the courses of the curves and the connection of the anomalies with the distribution of oil zones are examined.--W. Ayvazoglou.

(3053) SUR LA CROISIÈRE GRAVIMÉTRIQUE DU SOUS-MARIN FRESNEL DANS LA PARTIE NORD-OUEST DU BASSIN MEDITERRANEAN IN 1933-34

ON THE GRAVIMETRICAL CRUISE OF THE SUBMARINE "FRESNEL" IN THE NORTHWEST PART OF THE MEDITERRANEAN SEA IN 1933-34

By Pierre Marti

Comptes Rendus, Académie des Sciences, Paris, vol. 201, no. 22, Nov. 25, 1935, pp. 1019-1020.

The results of gravimetrical measurements carried out by the author in he northwestern part of the Mediterranean Sea on board the submarine Fresnel" are described. Vening-Meinesz apparatus was used. Thirty stations, bout 80 km. apart, were determined on the sea; and, in order to connect the ravimetrical net with the shore, 6 additional stations were determined on and.

The distribution of the stations and the anomalies established are shown n a map. Theoretical calculations will be published later.--W. Ayvazoglou.

2. MAGNETIC METHODS

(3054) MAGNETIC ANOMALIES IN THE REGIONS OF KHOMUTOVSK, KONYSHEVSK, AND NORTHWEST PARTS OF THE PROVINCE OF KURSK. (IN RUSSIAN)

By A. A. Strona

Razvedka Nedr, Moscow, vol. 5, no. 22, 1935, pp. 19-21

The author mentions a series of magnetic anomalies discovered recently n connection with the great Kursk anomaly. Detailed magnetic surveys on the whole northwestern part of the Province of Kursk are recommended.--W. Ayvazoglou.

(3055) TERRESTRIAL MAGNETISM AND THE EARTH'S INTERIOR

By S. Chapman

Observatory, London, vol. 58, no. 735, 1935, pp. 249-250

According to a note given on this paper in Terrestrial Magnetism and Atmospheric Electricity, vol. 40, no. 4, December 1935, this is "A brief letter calling attention to the importance of terrestrial magnetism in furnishing information regarding the physical state of the earth's interior."

3. SEISMIC METHODS

(3056) APPLICATION OF SEISMIC REFLECTION METHOD TO GEOLOGICAL PROSPECTING IN THE REGION OF ISHIMBAEV (IN RUSSIAN)

By E. A. Koridalin and S. J. Masarsky

Neftianoe Khoziaistvo, Moscow, vol. 28, no. 8, 1935, pp. 27-30

After a brief outline on the principles of seismic methods of prospecting in general, the authors describe in detail the results of seismic prospecting carried on in the oil-bearing region of Ishimbaev. A series of seismograms produced by shots made at various distances (440 to 900 meters) are examined.--W. Ayvazoglou.

(3057) GEOLOGIC DEDUCTIONS FROM EARTHQUAKES OF DEEP FOCUS

By J. S. deLury

Journal of Geology, Chicago, vol. 43, no. 7, 1935, pp. 759-764

From the maze of geophysical data, little concrete evidence emerges to permit widely acceptable views on the strength of rocks at different depths in the earth's interior. Seismologists have established the existence of a high degree of rigidity down to great depths, but the commonly held view that earthquakes are of shallow origin has lent support to the opinion that correspondingly shallow rocks alone can permit the slow accumulation of elastic stresses. This opinion must change with the growing evidence that earthquakes probably originate in all levels down to depths of 700 or more kilometers. The same evidence is disturbing to the assumptions of isostasy and to those hypotheses that rest on the concept of a shell of weakness.--Author's abstract

(3058) SEISMIC WAVES (2ND PAPER)

By B. Gutenberg and C. F. Richter

Gerlands Beiträge zur Geophysik, Leipzig, vol. 45, no. 3, 1935, pp. 280-360

In a first paper under the present title (see Geophys. Abs. 71, p. 1383) the authors have presented data on travel times. The present paper contains the corresponding data on amplitudes, periods, velocities, etc., for bodily waves. The authors intend to present data on surface waves in a third paper.

Contents: 1. Introductory. 2. Seismograms used. 3. Statistical survey of periods. 4. Compressions and dilatations. 5. Theoretical considerations on amplitudes, travel times, velocities, and their relation. 6. Theory of the amplitude ratio PP/P and effect of crustal structure. 7. Observations of PP/P (a, continental reflections; b, Pacific reflections; c, Atlantic reflections; d, reflections in the Indian Ocean; e, reflections in the Arctic Basin; f, special and exceptional cases). 8. Other amplitude tios (a, PPP/P; b, PP/P^1; c, amplitudes of SS; d, amplitudes of PS, PPS, and SP). 9. Appearance of normal seismograms at various distances. 10. P and at short distances; the problem of discontinuities in the mantle of the rth. 11. Calculations for velocities of P and S at various depths in the ntle. 12. Velocity distribution within the core. 13. Calculated and ob- rved travel times and additional data. 14. Poisson's ratio; references.

Sixteen figures and 27 tables.--W. Ayvazoglou.

(3059) GEOPHYSICAL PROSPECTING FOR OIL IN 1935

By E. deGolyer

Mining and Metallurgy, New York, vol. 17, no. 349, 1936, pp. 62-63

This is a brief review of geophysical surveys for oil during 1935.

The center of greatest activity continued to be the Gulf Coast of Texas d Louisiana (gravity surveys and dip shooting). Prospecting in other parts the United States and in Mexico is mentioned.

Seismic surveys by the reflection method increased considerably, the tal number of crews in operation in early December being approximately 150, compared with 100 at the same time in 1934. A table shows the distribution scismic crews.

Oil pools discovered by geophysical methods are mentioned.--W. Ayvazoglou.

(3060) EARTHQUAKE NOTES

R. R. Bodle, Editor

stern Section, Seismological Society of America, Washington, vol. 7, no. 3, 1935, 9 pp.

Contents: 1. Canal Zone Instrumental Seismic Records, by R. Z. Kirk- atrick. 2. The Formosa and Quetta earthquakes. 3. Earthquakes in Helena, ont.. 4. Strong-motion record, Los Angeles, October 24, 1935. 5. The imiskaming earthquake. 6. Suggestions for seismograph operation. 7. Quo- ations from Engineering News Record, October 24, 1935, p. 584 (in connection ith Helena earthquakes). 8. Helena, Mont., November 28, 1935. 9. Weston, ass., Seismograph Station. 10. College, Alaska, seismograph. 11. Dr. oward McClenahan. 12. Personalia. 13. Invitation from Geological Society f America. 14. Papers published in full in last issue of Earthquake Notes. 5. Epicenters.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(3061) DIE MESSUNG DER ELEKTRISCHEN STRÖMUNG IM RÄUMLICHEN LEITER

(MEASUREMENT OF ELECTRIC CURRENT IN A SPATIAL CONDUCTOR)

By J. N. Hummel

Zeitschrift für Geophysik, Braunschweig, vol. 11, no. 6, 1935, pp. 321-32

A method is given by which it is possible to measure directly the curren density in a spatial conductor by means of one measuring operation.

Chapters of the article are as follows: 1. Importance of current measurement in Geophysics. 2. Calculation of the current from voltage and resistance. 3. Direct current measurement. 4. Technical remarks on measurement. 5. Application of the direct current measurement to the pure and applied geophysics.--W. Ayvazoglou.

(3062) QUESTIONS CONCERNING THE METHODS OF PROSPECTING FOR COAL DEPOSITS (IN RUSSIAN)

By D. V. Kozhevin

Razvedka Nedr, Moscow, vol. 5, no. 22, 1935, pp. 26-30

The application of electrical coring, the principles of which are briefl described, is highly recommended as a cheap method for determining the thickness of coal deposits, thus making it possible to calculate with a great degre of accuracy the comparative commercial value of various deposits.--
W. Ayvazoglou.

(3063) DETECTION OF UNDERGROUND WATER

Editorial

Chemical Engineering and Mining Review, Melbourne, vol. 28, no. 326, 1935, pp. 15-16.

The experiments in application of electrical methods for detecting underground water carried out in the coal districts of South Wales by A. H. Cox, D. A. B. Davies, and T. G. Williams (see Geophys. Abs. 80) are briefly discussed.--W. Ayvazoglou.

(3064) EINIGES ÜBER ANWENDUNG DER KAPAZITÄTSMETHODE IN DER PRAKTISCHEN GEOLOGIE

(ON THE APPLICATION OF THE CAPACITY METHOD IN THE APPLIED GEOLOGY)

By Volker Fritsch

Zeitschrift für praktische Geologie, Halle, vol. 43, no. 12, Dec. 1935, pp. 184-190

The principle of the method is described.

In conclusion, the author indicates that although the main principles of he capacity method are well explained at the present time, further investigaion must be carried on in order to obtain the necessary experimental material.

The general application of this method will be possible only after a suffiient amount of experimental material is collected.--W. Ayvazoglou.

(3066) SULL IMPIEGO DELLE CURVE UNIVERSALI DI RESISTIVITA APPARENTE DI HUMMEL

(ON THE APPLICATION OF HUMMEL'S APPARENT RESISTIVITY UNIVERSAL CURVE)

By A. Belluigi

Beiträge zur Angewandten Geophysik, Leipzig, vol. 5, no. 3, 1935, pp. 296-302

The author draws attention to the methods by which the testing of the inluence of "n" superposed layers of infinite extention is reduced to the case f two layers. The method can be extended to the not uncommon special cases of eological-mineralogical prospecting for finite bodies.

The author confirms a principle, which is now common, for the derivation f physical anomalies of the underground based on curves of physical influences btained from experiment; that is, the principle of identification of theoretial curves with those obtained by experiments. After showing the large field f application of the two-layer method, the author makes an analytical test of ummel's $\frac{\rho_s}{\rho}$ curves.

The author provides a strict evaluation of these curves, point by point, nd shows the possibility of extending, in each case, the exactness to that rder of magnitude which depends only on the value of the basic measurements, n the actual difficulties of the terrain, and on the sensitiveness of the pparatus.--Author's abstract.

(3067) THE LOCAL VARIATION OF THE EARTH'S ELECTRIC FIELD

By Joseph G. Brown

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 40, no. 4
December 1935, pp. 413-425

Assuming that local diurnal-variations are small over the oceans and absent over the polar ice during the winter night, a curve has been adopted which represents the unitary diurnal variation for a mean ocean field of 129 volts per meter. The unitary variation at each land station has been found by multiplying the ocean variation by the ratio of the mean land gradient at each station to the mean ocean gradient. By subtracting these unitary variations from the observed mean curves, the local diurnal variations have been obtained for 22 stations. Each local variation curve has been resolved into a 24-hour component and a daytime depression component. The stations fall into groups, according to latitude, and the mean latitude stations are of two types, depending upon the amount of pollution. A theory is proposed which shows the significance of the components and accounts for the local diurnal-variation by the cycle of turbulence, connection, and subsidence which is present at all land stations on all clear days.--Author's abstract.

(3068) EARTH-RESISTIVITY SURVEYING

By C. F. Tagg

The Mining Magazine, London, vol. 54, no. 1, 1936, pp. 27-30

Theoretical notes on the central electrode method, that is a method in which the arrangement of electrodes for greater depth determinations at a given point is made in such a way that it is necessary to move only one or two electrodes.--W. Ayvazoglou.

(3069) A GEOPHYSICAL TEST ON A KENYA PROPERTY

By W. Pulfrey

The Mining Magazine, London, vol. 54, no. 1, 1936, pp. 30-32

The author describes an experimental test of the resistivity method of surveying carried out over a mining property in Kenya. The method employed was that using the Megger tester, measuring directly in ohms the ratio E/I, where E is the potential difference between the two generator rods and I the current passing between the two inner rods.

A sketch plan of geology and resistivity test lines, Kibiri mine, Kakamega District, Kenya, is given.

From the results obtained, a conclusion is drawn that in localities cap-le of being verified initially by pitting, the Megger test method, as used Kibiri, might prove a potent tool in the hands of the prospector.—W. vazoglou.

5. RADIOACTIVE METHODS

(3070) SUR LA PROSPECTION RADIOMÉTRIQUE D'UNE COULÉE DE RHYOLITE

(THE RADIOMETRIC EXPLORATION OF A RHYOLITE COULÉE)

By Edmond Rothé and Mrs. A. Héo

Comptes Rendus, Académie des Sciences, Paris, vol. 201, no. 20,
Nov. 12, 1935, pp. 892-893.

The rhyolite near Welschbruch is strongly radioactive and it has been und possible to map out the volcanic coulee by radiometric measurements.-- Ayvazoglou.

(3065) BEITRÄGE ZUR RADIOGEOLOGIE

(CONTRIBUTION TO RADIO-GEOLOGY)

By Volker Fritsch

itrāge zur angewandten Geophysik, Leipzig, vol. 5, no. 3, 1935, pp. 315-364.

The purpose and the sphere of action of radio-geology is discussed in the itroduction to this article. Radio-geology deals with the investigation of itual felations existing between the alterations of high frequency electro-agnetic fields and the geological conductors. The electrical properties of ological conductors are treated and an attempt is made to work out theories r definite formations. The electrical properties of the ground are discussed ased on numerous publications.

A list of literature dealing with the results of observations and subsoil rveys is included.

In addition to these data, the author has published his own experiments d compares the results of his short-wave and long-wave surveys carried out t the Punkwa district, at Kotterbach, along the Czechoslovakian railroad and n the river Danube.

Contents: 1. High-frequency electromagnetic field. 2. Geological onductor (a, structure; b, properties of the basic elements; c, compound onductors). 3. Practical measurements (a, general measurements; b, distri-ution of the field on the surface of the geological conductor; c, distribu-ion of the field inside of the geological conductor).

Conclusions and list of reference.--Author's abstract.

(3071) PRODUCTION OF COSMIC RAY SHOWERS AT A CONSIDERABLE DEPTH BELOW GROUND LEVEL

By D. H. Follett and J. D. Crawshaw

Nature, London, vol. 136, no. 3452, 1935, p. 1026

From an abstract given in the same number of "Nature", p. 1030, we read: "Experiments carried out below ground at a depth equivalent to 60 m. water, by D. H. Follett and J. D. Crawshaw, show that cosmic rays which penetrate to thi depth have, proportionately, the same ability to produce electron showers as those at the earth's surface, thus indicating that they consist of positive an negative electrons. These findings are not in agreement with those of previou investigators, who have reported rapid diminution of the ratio of the rate of shower production, or even complete absence of showers, at lesser depths."

6. GEOTHERMAL METHODS

(3072) NEUE GEOTHERMISCHE MESSUNGEN IN EISENSTEIN- UND ERZGRUBEN DES RHEINISCHEN GEBIRGES

(NEW GEOTHERMAL MEASUREMENTS IN IRONSTONE MINES AND ORE MINES OF THE RHINE MOUNTAINS

By H. Quiring

Glückauf, Essen, vol. 72, no. 3, 1936, pp. 57-62

Tables showing the results of temperature measurements in various mines of the Rhine Slate Mountains (Rheinische Schiefergebirge) are given. From the new temperature measurements in these mines the author obtained a geothermal gradient in Devonian Period equal to about 45 meters.--W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(3073) THE REGION OF CHUSOVSKIE GORODKI IN THE LIGHT OF GEOPHYSICAL INVESTIGATION (IN RUSSIAN)

By V. P. Skvortsov

Neftianoe Khoziaistro, Moscow, vol. 28, no. 8, 1935, pp. 30-34

This article deals with the analysis of geophysical data (gravimetrical and electrical) obtained in the region of Chusovskie Gorodki (Urals) and with the practical conclusions that may be drawn from them. A structural map and maps of gravimetrical and electrical surveys carried out in this region are

led and examined. Conclusion is drawn that gravimetrical and electrical in-
stigations may be used successfully for determining possible accumulations
oil.--W. Ayvazoglou.

(3074) THE PROBLEM OF CONTOURING OIL DEPOSITS ACCORDING TO DATA OBTAINED BY GAS SURVEY (IN RUSSIAN)

By P. L. Antonov

Neftianoe Khoziaistvo, Moscow, vol. 28, no. 10, 1935, pp. 33-35

A theoretical scheme of contouring oil deposits is given. The scheme is
nsidered by the author as being approximative only, as the inequalities of
 layers are not taken into account; but, by supposing that the different
yers may finally produce a mean coefficient of diffusion very close to that
tained in a homogeneous medium, the application of the scheme for practical
k is considered possible.--W. Ayvazoglou.

(3075) SALT DOMES - THE IMPETUS TO GEOPHYSICAL PROSPECTING

By R. A. Steinmayer

Transactions, Electrochemical Society, New York, vol. 67, 1935, pp. 37-50

In the Gulf coastal prairie of Louisiana and Texas occur a number of
ique salt domes, deep-seated, subcircular, corelike masses of salt, which
ve been intruded into the overlying beds and mantle rock. Many of these
nes are buried far below the surface, and the absence of a surface expression
 these domes has led to the application of geophysical methods of detection
 location. The following methods of geophysical prospecting are briefly
viewed: Electrical, electromagnetic, seismic, gravitational, magnetic,
dio-active, and geothermal. The seismic method found its first practical
plication in salt-dome exploration in Louisiana and Texas. The velocity in
 salt may be three times the velocity in the surrounding rocks.--Author's
stract.

(3076) AERIAL AND GROUND MAPPING AIDS DEVELOPING NEW AREAS

By William Bowie

Oil and Gas Journal, Tulsa, vol. 34, no. 33, 1936, p. 33

Geophysicists working in the oil and gas industries find their work handi-
pped at present in areas that are not mapped. The nature of the work under-
ken by the Federal government to map the entire United States is briefly out-
ned by the author in this article.--W. Ayvazoglou.

(3077) GEOPHYSIKALISCHE MESSUNGEN

(GEOPHYSICAL MEASUREMENTS)

By A. Graf

Archiv für Technisches Messen, Munich, vol. 4, 1935, no. 40, pp. T131 and 132
and no. 41, pp. T143 and 144

In the first part of this article the author gives a general outline of geophysical methods of prospecting (gravimetrical, magnetic, electrical, seismic, radioactive); in the second part the seismic methods are described more in detail.--W. Ayvazoglou.

(3078) VISITE DES CONGRESSISTES À LA SOCIÉTÉ DE PROSPECTION ÉLECTRIQUE (PROCÉDÉS SCHLUMBERGER)

(VISIT OF CONGRESSMEN AT THE SOCIÉTÉ DE PROSPECTION ELÉCTRIQUE, SCHLUMBERGER'S METHODS)

Editorial Note

Mines, Carrières, Grandes Enterprises, Paris, vol. 14, no. 158, 1935, pp. 1-

This is a brief description of technical demonstration on geophysical methods of prospecting made by the Société de Prospection Électrique to the members of the International Mining Congress (7th Session) held on October 22 1935.--W. Ayvazoglou.

(3079) GEOPHYSICAL METHODS ABOVE FROZEN GROUND (IN RUSSIAN)

By A. T. Akimov

Razvedka Nedr, Moscow, vol. 5, no. 22, 1935, pp. 30-33

The investigation of this question is considered by the author of great importance, owing to the fact that the underground of about 45% of the whole territory of the U.S.S.R. remains frozen permanently. In erecting large constructions, the depth of the permanently frozen ground beneath them increases thus changing the structural conditions of the underground, resulting often in the collapse of the buildings.

Electrical and seismic methods of prospecting are recommended for determining the depth of the frozen underground.--W. Ayvazoglou.

(3080) STUDY OF STRUCTURAL PROBLEMS BY GEOPHYSICAL MEANS GAINS IN IMPORTANCE

By Sherwin F. Kelly

Mining and Metallurgy, New York, vol. 17, no. 349, 1936, pp. 9-11

In this article Kelly gives a brief review of some high lights in geo-ysical work carried out in various parts of the world during 1935, and he aws the conclusion that a definite trend towards a decreasing emphasis on e direct location of mineral bodies and an increasing utilization of geo-ysical techniques in the working out of structural problems is evident. e solution of such problems may be of assistance in locating commercial ore-dies, or it may be directed towards aiding geologists in the areal mapping subsurface features of general geological interest. In either case, they emplify "the application of geophysical methods as they should be applied, tegrated into a coherent, unified technique, in which the older geological ethods and the newer geophysical ones combine with the drill to create an ploration program which is well balanced and powerful enough to cope with e increasing difficulties constantly being encountered."--W. Ayvazoglou.

(3081) SUMMARY OF THE YEAR'S WORK, DEPARTMENT OF TERRESTRIAL MAGNETISM, CARNEGIE INSTITUTION OF WASHINGTON

By J. A. Fleming

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 40, no. 4, December 1935, pp. 385-392

The activities of the Department of Terrestrial Magnetism are grouped nder the following general divisions: 1. Reduction and study of accumulated bservational data. 2. Further development of technique and apparatus to ccord, photographically, the electrical conditions and variations in the onosphere, and their investigation and correlation with other geophysical henomena. 3. Continued theoretical formulation and experimental investiga-ion, in the laboratory, of basic aspects of nuclear physics and magnetism. . Maintenance of observational program in the field to make for continuity f secular variation data and of recording at observatories of the Department he seasonal, diurnal, and irregular changes in the earth's magnetic and lectric fields.

The results obtained and progress made in the investigational and experi-ental work are summarized.--W. Ayvazoglou.

9. NEW BOOKS

(3082) Hecker, O. Möglichkeiten der Erforschung des Erdinnern. (Possibilities for exploration of the earth's interior.) Lecture delivered in Stuttgart on March 11, 1935, 26 pp. 8 figs. Jena, 1935. Verlag von Gustav Fischer. Results of explorations and further possibilities of investigation are discussed. A brief review of modern methods of applied geophysics, especially for discovering oil, is given.

(3083) Joos, Georg. Lehrbuch der Theoretischen Physik. (Handbook of theoretical physics.) Second edition, 676 pages, 1935. Akademische Verlagsgesellschaft m.b.H., Leipzig. Price, M. 24. Contains information on the theoretical and physical foundations of geophysics.

(3084) Seismos Geophysical Company. Recent Geophysical Abstracts of Hanover, Germany, 1935, 50 pp. 35 illus. From a brief review by Donald C. Barton (Bull., Am. Ass. Petr. Geologists, vol. 20, no. 1, 1936) we read: "This paper gives a brief, simple, well written description of the work which 'Seismos' does. A brief elementary statement is given of the principles of the seismic and gravitational methods and of the Eötvös torsion balance and the Thyssen gravimeter. These discussions are well illustrated by diagrams. Many photographs are introduced to illustrate the actual use of the methods of the field. Twelve maps of the results of actual field surveys are given in addition, as well as several geophysical profiles and traced reproductions of seismograms.

"The new Thyssen static gravity meter, according to the data of this pamphlet, seems to be a fast, handy, and accurate instrument. The accuracy of the instrument, according to the only partially satisfactory data of the error of closure of closed traverses, seems to be of the order of magnitude of p.e. = ±0.3 milligals.

"Most geophysicists and most geologists or executives who deal with geophysics will find this pamphlet interesting and instructive."

10. PATENTS

(3085) SEISMIC SURVEYING

Earle W. Johnson, Dallas, Tex. Assignor to Western Geophysical Company, Tulsa, Okla., a corporation of Delaware.

U.S. Patent 2,028,286 Issued Jan. 21, 1936

This invention relates to a method of determining an underground geological structure comprising drilling a small hole from the surface of the ground into a formation, forming an enlarged cavity in said formation at the base of said hole, thereafter detonating an explosive charge within said cavity, and receiving and recording the resulting seismic waves after said waves have penetrated to said structure.

Claims allowed - 20

(3086) METHOD OF ELECTRICAL PROSPECTING FOR OIL

A. G. Ivanov and V. S. Voiutsky

ssian Patent 43981 Issued August 1935

Title only.

(3087) DEVICE OF MAGNETIC PROSPECTING FOR DEPOSITS

P. P. Kuznetsov, N. P. Kniupfer, and I. V. Khmelevski

ssian Patent 43982 Issued August 1935

This invention relates to a device for magnetic prospecting characterized the application of a combined magnetic needle provided with three poles, o having the same sign and one the opposite sign.

Claims allowed – 2

(3088) ARRANGEMENT FOR MAKING CONNECTION WITH THE GROUND IN ELECTRICAL PROSPECTING

M. D. Fergev

ssian Patent 43983 Issued August 1935

This arrangement consists mainly of a disk provided with one or several ows of metallic pins.

Claims allowed – 2

(3089) ARRANGEMENT FOR TIBERG-THALEN MAGNETOMETER

B. A. Naumov

ssian Patent 44029 Issued August 1935

Title only.

3090) ELECTROMAGNETIC THEODOLITE FOR DETERMINING THE ELEMENTS OF THE TERRESTRIAL MAGNETIC FIELD

By A. F. Platonov

ssian Patent 45077 Issued November 30, 1935

Title only.

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April 1936.

DEPARTMENT OF THE INTERIOR
UNITED STATES BUREAU OF MINES
John W. Finch, Director

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GEOPHYSICAL ABSTRACTS
MINING DIVISION

ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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1. GRAVITATIONAL METHODS

(3091) WARPING OF FORMATIONS ALONG THE GULF COAST MAKES GRAVITY SURVEY DESIRA

By Cyril K. Moresi

Oil Weekly, Houston, vol. 80, no. 9, 1936, p. 48.

The author explains the high desirability of an absolute gravity survey the erection of monuments or bench marks essential to reliable map making (se Geophys. Abs. 81, pp. 1671 and 1672). According to the author Louisiana is pa ticularly interested, as the Louisiana Geological Survey is actively engaged determining the fundamental conditions making possible the vast petroleum accu lations along the Louisiana coast. In his opinion there is no other section the United States where an absolute gravity survey would better assist such a large group of scientists who are actively engaged in exploring the undergrou structures and who are endeavoring to unravel its geological history.--W. Ayvazoglou.

(3092) CONTRIBUTION TO THE RELATIONSHIP BETWEEN GRAVITATION AND SEISMICS (IN RUSSIAN)

By S. Ju. Geller

Comptes rendus de l'Académie des Sciences, U.S.S.R., Moscow,
vol. 4, no. 3, 1935, pp. 147-148

The relationship between earthquakes and gravitational conditions of the earth's crust is discussed based on the results of measurements carried out a the same places (Ashkhabad and Tedzhen) in 1906 and 1934. The difference in gravitation determined by measurements is attributed to the earthquakes that occurred during the period of time between 1906 and 1934, especially to that of May 1, 1929.--W. Ayvazoglou.

(3093) TABLES FOR DETERMINING THE FORM OF THE GEOID AND ITS DIRECT EFFECT ON GRAVITY

By Walter D. Lambert and Frederic W. Darling

Coast and Geodetic Survey, Washington, D. C. Special
Publication 199, 1936, 150 pp.

The present work is intended to facilitate the solution of problems involving the deviation of the geoid from the spheroid of reference, with especial reference to the intensity of gravity.

Part I - Fundamental tables.
Part II - Density of compensation for computing special Bowie tables.
Part III - Bowie isostatic reduction tables.
Part IV - Determination of the geoid from gravity anomalies.
Appendix - Miscellaneous tables.

explanation of the tables is given in the beginning of the book.--
Ayvazoglou.

(3094) FORMULAS AND TABLES FOR THE COMPUTATION OF GEODETIC POSITIONS ON THE INTERNATIONAL ELLIPSOID

By Walter D. Lambert and Clarence H. Swick

Coast and Geodetic Survey, Washington, D. C. Special Publication no. 200, 1936, 120 pp.

ntents: 1. Introduction: The international ellipsoid of reference.
2. Solution of triangles.
3. Spherical excess.
4. Number of decimal places in angles and lengths.
5. Computation of differences of latitude, longitude and azimuth: (a) Computation of geodetic positions; (b) inverse position computation.
6. Arc-sine correction: Arc-sine correction for inverse problems.
7. Examples of computation: Computation of triangles.
8. Tables I to VI.
9. Formulas for converting geodetic latitude into other kinds of latitude and vice versa.
10. Formulas for various radii of the ellipsoid.
11. Table VII - Logarithms of the factors A, B, C, D, E, and F based on the international ellipsoid.--W. Ayvazoglou.

2. MAGNETIC METHODS

(3095) LOCATING BURIED PIPE LINES

Editorial Note

Natural Gas, Cincinnati, vol. 17, no. 2, 1936, p. 25

The note reads as follows:

The General Electric Co., Schenectady (N.Y.), has developed a magnetic detector for locating buried pipe lines, the exact locations of which are unknown. The instrument is a surveying compass with an adjustable bar magnet for reducing the control effects of the earth's magnetic field and making it more susceptible to a local magnetic pull. It can be used with or without electric current and has located pipes buried 7 feet in the ground.

(3096) GEOPHYSICAL SURVEYING WITH AN OSCILLATING MAGNETIC NEEDLE

By R. McAdam

Colliery Guardian, London, vol. 151, no. 3912, 1935,
pp. 1127-1129.

The author describes a new method of magnetic surveying by an instrument called "Oscilloscope."

1. Construction of oscilloscope: The magnet consists of a piece of chrome steel, 1 inch long of #14 wire gage. The suspension consists of a 7-inch length of 0.018-mm phosphor-bronze wire. The top end of the suspension is attached by sealing wax to a torsion head inserted in the top of the carrying case. The case is made of ordinary white wood, the external dimensions being 9 by 6 by 5 inches. A schematical design of the apparatus is given.

2. Practical application: The apparatus was used in surveying (a) the location of the Pentland fault, and (b) the location of the Prestongrange dike (maps are added). The average error of the results, under normal conditions, was less than 20 gammas.--W. Ayvazoglou.

(3097) MAGNETIC ANOMALIES AND IGNEOUS ROCKS

By M. C. Malamphy, I. C. Amaral, and D. S. Oddone

Am. Inst. Min. Metall., New York, Contribution 96, 1936, 19 pp.

Igneous rocks constitute one of the most important causes of the local anomalies observed in the course of geophysical prospecting by the magnetic method. Igneous intrusions in a variety of forms are common to all South Brazil, and the magnetic surveys made during the last 4 years have permitted observation of characteristic anomalies over certain intrusive forms whose existence is proved by the geological evidence available. Selected examples of characteristic anomalies due to dikes, sills, lava flows, laccoliths, and batholiths are presented. Geological sections are also presented wherever they will aid explanation of the geophysical data. Theoretical calculated anomalies are presented for a few cases and are discussed.

The second most important cause of magnetic anomalies is the crystalline basement; therefore, some data are presented indicating the variation in the magnetic field in regions of old gneissic rocks. The paper is illustrated with magnetic profiles, both observed and calculated, corresponding geologic sections and maps.--Author's abstract.

(3098) MAGNETISCHE BODENFORSCHUNGEN IM AUSSERALPINEN WIENER BECKEN UND AM ALPENRAND BEI WIEN

(MAGNETIC PROSPECTING IN THE OUTER-ALPINE VIENNA BASIN AND ON THE BORDER OF THE ALPS NEAR VIENNA)

By Karl Forberger

Petroleum, Berlin, vol. 32, no. 5, 1936, pp. 1-10.

In the preface to Forberger's article Petrascheck gives some consideraons based on which the investigations were undertaken and indicates the diffilties especially in disclosing the nature of the borders of the Alps. He conludes that the data and the curves obtained by Forberger will certainly be dissed by geologists, but finally more information on the magnetic attitude of is region may be obtained.

The magnetic survey was carried out in extension of the measurements made the Alpine-Vienna Basin in 1933 to the outer-alpine parts of this region. e method of the measurements, the choice of the profiles, and the interpretaon of the results of measurements are discussed.

A table giving the number of the station, difference in latitude, differnce in longitude, the reduced intensity, and the disturbance for 188 stations s added.--W. Ayvazoglou.

(3099) MAGNETIC SURVEYING VALUABLE TO MINING PROSPECTOR

By Eugene E. Bergman

Mining Journal, Phoenix, Ariz., vol. 19, no. 18, 1935, pp. 3-4.

According to the author, the purpose of this paper is to show that magetic methods have considerably greater possibilities in solving structural roblems than have been ascribed to them heretofore. Bergman presents a numer of actual experiences in the use of magnetic prospecting. Not only have romising areas for exploration been located, but worthless areas have been liminated, both resulting in an important saving in time and expense. The skania magnetometer was used for the magnetic surveys reported in this paper. wo figures, one showing a sketch of the magnetic traverses, and the profiles n vertical intensity of these traverses, of a silver-lead vein in a property ear Bonner's Ferry, Idaho, and the other showing lines of equal magnetic nomaly in the vertical field of a part of the Jordan property located in the wank River district of central Washington are presented. Two more examples re given to show the applicability of magnetic surveying to the majority of ining districts.--W. Ayvazoglou.

3. SEISMIC METHODS

(3100) SEISMIC PROSPECTING BY THE METHOD OF REFLECTED WAVES

By E. A. Koridalin and S. I. Masarsky

Doklady Akademii Nauk U.S.S.R., Moscow, vol. 3, no. 3,
1935, pp. 121-124

After a brief outline of the principles of the method the authors discuss an example carried out by them in the Ishimbaev oil-bearing region. Based on the results obtained the authors proved the possibility of the application of the method of reflected waves in prospecting for oil.--W. Ayvazoglou.

(3101) ENGINEERING SEISMOLOGY

By Frank M. S. Johnson

The Mines Magazine, Denver, vol. 25, no. 12, 1935, pp. 24-29 and 36

In this paper the author presents the method of analysis, without making any effort to draw definite conclusions, regarding the practicability of the flexible-base type of building construction. However, certain tentative conclusions drawn from computations discussed in this article are briefly summarized by the author as follows:

1. The period of acceleration is as important as the acceleration itself, in its effect on the deflection of the structure. A period of 0.7 second instead of 1.0 second, cuts the deflections roughly in half.

2. The impact effect of an acceleration suddenly applied to a flexible structure of this type has little or no effect on the deflection.

3. An irregular swing gives greater deflections than a uniform and rhythmic swing, and within the range of probable maximum periods of acceleration there is no evidence of resonance if the free period of vibration of the structure is kept above 2.0 or 2.5 seconds.

4. The maximum deflection produced in a structure by a given ground motion is not much affected by considerable changes in the period of free vibration of the structure. For this reason, the best measure of the earthquake-resistant qualities of a given building of this type is simply the maximum horizontal deflection that it can sustain without exceeding allowable stresses in the columns.

5. It is likely to be found difficult to provide sufficient lateral flexibility in this type of structure if the most unfavorable

period and other conditions of acceleration are assumed. Long base columns will have to be provided, probably with some form of hinged base, in which case the steel that must be added in these columns and in the restraining beams to which they frame at their top, in order to provide a reasonable resistance to wind pressure, will be found to be a large and important item.--W. Ayvazoglou.

(3102) VERHALTEN DER LUFTDAMPFUNG UND BESTIMMUNG DES DAMPFUNGSGRADES BEI SEISMOGRAPHEN UND ERSCHÜTTERUNGSMESSERN

(BEHAVIOR OF AIR-DAMPING AND DETERMINATION OF THE DEGREE OF DAMPING IN SEISMOGRAPHS AND OSCILLATION-METERS)

By Kurt Werner

Zeitschrift für Geophysik, Braunschweig, vol. 11, no. 6, 1935, pp. 288-307.

The idea of "damping" in seismics is explained and the effect produced by
a air-damping device is described for two types of seismographs (field seismo-
aph, mass 6 kg, natural frequency 5 Hz.; stationary instrument, mass 17,000
, natural frequency 0.8 Hz.). The damping resistance in proportion to the
locity of the indicator is examined. The damping ratio ε is derived theo-
tically. Conditions necessary for a registering apparatus to keep the ac-
racy of ε equal to 10 percent are calculated. The most suitable method to
applied for instruments with short natural periods is given. The applica-
ion of the theory to curves obtained from experiments shows that by using
rious methods the same damping value is obtained, within 10 percent, for the
tio not over ε= 6:1.--W. Ayvazoglou.

(3103) ÜBER DIE AUSBREITUNG SINUSFORMIGER BODENBEWEGUNG

(ON THE PROPAGATION OF SINUSOIDAL MOVEMENT OF THE GROUND)

By Gustav-Adolf Schulze

Zeitschrift für Geophysik, Braunschweig, vol. 11, no. 6, 1935, pp. 307-321.

A method is given for measuring the velocity of propagation of artifi-
ially produced sinusoidal movements of the ground. 1,350 m/sec. was obtained
or the upper shell limestone at a frequency equal to 3 cycles per second.
he dependence of the velocity from frequency was examined. Changes of fre-
uency in the oscillation of the ground, caused by starting an engine, pro-
uced at a certain distance pulsations. The latter were explained by the
oincidence of waves of different periods which propagated by two different
ourses and with different travel time. From these measurements the thickness
f the uppermost layer could be determined.--Author's abstract, translated by
. Ayvazoglou.

(3104) BESTIMMUNG VON SCHICHTNEIGUNGEN AUS DEM EMERGENZSTRAHL BEI SPRENGUNGEN

(DETERMINATION OF INCLINATIONS OF LAYERS FROM THE EMERGENCE-RAY DURING EXPLOSIONS)

By Rolf Bungers

Zeitschrift für Geophysik, Braunschweig, vol. 11, no. 6, 1935, pp. 326-32

The deviation of the horizontal projection of the emergence-ray from the direction of the basis of the explosion is explained by the inclination of th refracting layer in the subsoil. This is used for calculating the inclinatio and the angle of incidence of the layer.--Author's abstract, translated by W. Ayvazoglou.

(3105) ÉTUDES SUR LA PHASE DES TREMBLEMENTS DE TERRE DITE "PHASE MAXIMA"

(STUDY OF THE SO-CALLED "PHASE OF MAXIMA" OF EARTHQUAKES)

By Alex. Dinca-Samuracas

Union Géodésique et Géophysique Internationale, Association de Séismologie, Toulouse, series A, no. 12, 1935, pp. 5-99.

The author makes an attempt to study in detail the true movement of the ground and the oscillations produced by the so-called "phase of maxima", as this knowledge may serve us for discovering the characteristic properties of the earth's crust and thus for explaining various problems closely related to geology.

Contents of the article:

Chapter 1. Study of vibrations with regard to their magnitude and position; (a) True movement of the ground, the three components. True curves; (b) Constants of the instrument and calculation of the elements necessary for converting the recorded curves into true movement; (c) resultant of true elongation in space; (d) material representation in space; (e) device for the convenient construction in space.

Chapter 2. Discussion of the results of calculations;

Chapter 3. Appearance of seismograms in maximum phase;

Chapter 4. Effect of supporters and of the installation of instruments. Variation of the amplitude.

The article is illustrated by diagrams and tables.--W. Ayvazoglou.

(3106) LA PÉRIODE SÉISMIQUE VÉSUVIENNE DES PREMIERS JOURS DE FÉVRIER 1933

(THE VESUVIAN SEISMIC PERIOD DURING THE FIRST DAYS OF FEBRUARY 1933)

By Francesco Signore

Union Géodesique et Géophysique Internationale, Association de Séismologie, Toulouse, series A, no. 12, 1935, pp. 101-104.

A brief report on the date, time of the beginning, maximum phase and the d of the shock, the double amplitude in mm. deduced directly from the seismo-ram, and the nature of the first impulse of the February 1933 earthquake is iven.--W. Ayvazoglou.

(3107) SEISMIC TIME-CURVES FOR EPICENTRAL DISTANCES AROUND 80°

By I. Lehmann

Union Géodesique et Géophysique Internationale, Association de Séismologie, Toulouse, series A, no. 12, 1935, pp. 109-136.

Lehmann undertook a detailed investigation of the European records of the leutian earthquake of July 7, 1929 in the attempt to trace SKS at epicentral istances around 80°, where it may be expected shortly after S. In all the ecords examined the author found strong movement between S and PS, but no efinite phase-grouping which permits the presence of SKS to be established.

An account of other results in connection with his investigation and con-erning (1) the epicenter, and (2) the phases is given in this article.--. Ayvazoglou.

(3108) MESURE DU COEFFICIENT DE RESTITUTION DES ROCHES

(MEASUREMENT OF THE COEFFICIENT OF RESTITUTION OF ROCKS)

By Jeanne Roess

Union Géodesique et Géophysique Internationale, Association de Séismologie, Toulouse, series A, no. 13, 1935, pp. 3-69.

The author discusses the method of measuring the coefficient of restitu-ion of rocks by dropping from various heights a steel ball on polished sur-aces of the plates of rocks under examination. The apparatus serving for his purpose is described.

The results of investigation of a series of rocks (41) are summarized in table and classified according to the values of their coefficients of restitution. The author concludes that if the method is properly conducted (especially concerning the height of fall of the ball) the results of measurements of the coefficient of restitution of rocks may serve for determining the elastic properties of rocks and thus also for making conclusions on their characteristics.--W. Ayvazoglou.

(3109) ÉTUDES DES ONDES PROVENANT DE SÉISMES ÉLOIGNÉS

(STUDY OF WAVES CAUSED BY DISTANT SHOCKS)

By Jeanne Roess

Union Géodesique et Géophysique Internationale, Association de Séismologie,
Toulouse, series A, no. 13, 1935, pp. 71-146.

After a brief introduction on the methods of the study the author mention the two categories of waves studied in this article: 1, Those the existence o which is certain; and 2, those connected with various hypotheses in the constitution of the globe, the earth's crust, and the center of the earth.

The whole article is divided into the following three chapters:

1. P and S waves and their derivatives.
2. Waves traversed through the center of the earth.
3. Remarks.

Figures and tables are added.--W. Ayvazoglou.

(3110) NOTE SUR LES SÉISMES EN CALIFORNIE

(NOTE ON THE EARTHQUAKES IN CALIFORNIA)

By C. Bois

Union Géodesique et Géophysique Internationale, Association de Séismologie,
Toulouse, series A, no. 13, 1935, pp. 147-166.

The article consists of three parts: In the first the author summarizes macroseismic data collected by him in connection with the earthquakes in California; in the second the seismicity of this and adjoining regions is studied by using the method of distribution over a net; the third is devoted to the study of records obtained in Strasbourg.--W. Ayvazoglou.

(3111) OBSERVATIONS SUR LE FROTTEMENT DANS LES INSCRIPTIONS SUR LE NOIR DE FUMÉE

(OBSERVATIONS ON THE FRICTION IN THE RECORDS MADE ON SOOT)

By J. Lacoste

Union Géodesique et Géophysique Internationale, Association de Séismologie,
Toulouse, series A, no. 13, 1935, pp. 167-193.

The friction introduced by the movement of the pen adds to the resistances, h as the friction of the suspension of the joints, springs, resistance of the r, etc.

In this article the author discusses and compares the theories on this bject established by: Galitzin (two theories), Reid, Sohon, Hagiwara, norovicic, Gassmann, Gutenberg, Berlage.

Some results of experimental investigations made by Lacoste with various pes of seismographs and pendulums are described.--W. Ayvazoglou.

(3112) NOTES ON THE THEORY OF MICROSEISMS

By F.J.W. Whipple and A.W. Lee

nthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, no. 8, 1935, pp. 287-297.

Several points in the theory of microseisms have been reexamined, mostly th reference to the work of Dr. S. K. Banerji (Geophys. Abs. 79, p. 1615). is maintained:

(a) That the risk of confusion between true microseisms and other disturbances indicated on seismograms is negligible.

(b) That there are instances in which equally violent storms of wind occur in the same part of the Atlantic, but the intensities of the microseismic disturbances at the surrounding observations are very different.

(c) That the ratio of horizontal and vertical components of microseismic movement depends on the geological structure round a seismological station, not on the distance from the ocean.

(d) That the mathematical theory of ocean waves can be extended to allow for the compressibility of the water. The analysis indicates that waves of two types can be propagated; there are practically the same as (1) the surface waves of the ordinary theory, and (2) waves of compression traveling obliquely through the water with the velocity of sound.

(e) That some progress towards a theory of microseisms can be made by realizing that the action between air and water is always fluctuating, both the length and width of a train of sea waves being comparatively small.--Author's abstract.

(3113) NOTE ON THE GENERATION OF FORCED OSCILLATIONS ON THE SEA-BED

By E. F. Baxter and J. A. Archer

Monthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, no. 8, 1935, pp. 298-302.

This note is written by the authors in the first place to correct some mathematical calculations in Banerji's paper on types of microseisms associated with disturbed weather in the Indian seas, explaining the observed periods and amplitudes by a mathematical analysis of the physical processes involved in the production of these movements. The paper was published in Phil. Trans. Roy. Soc. (A), no. 229, 1930.--W. Ayvazoglou.

(3114) SOME DEEP-FOCUS EARTHQUAKES

By Harold Jeffreys

Monthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, no. 8, 1935, pp. 310-343.

A detailed study of the following deep-focus earthquakes is given:

1926, June 26, E. Mediterranean.
1929, Feb. 1, Hindu Kush Mountains, Afganistan.
1929, Nov. 1, Rumania.
1931, Feb. 20, Eastern Siberia, near coast, and 1928, March 29, Pacific, off Japan.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(3115) RADIOTECHNISCHE ABSORPTIONSMESSUNG FÜR GEBIRGSMÄCHTIGKEIT

(MEASUREMENT OF THE THICKNESS OF OVERBURDEN BY RADIO ABSORPTION METHOD)

Editorial Note

Bohrtechniker Zeitung, Vienna, vol. 53, no. 9, 1935, p. 245.

Radio-technical absorption measurements are at present carried on in Southern Harz between Walkenried and Nordhausen, as well as in Mähren. In connection with these measurements the editorial note refers to the results ained by V. Fritsch from his inventigations carried out by radio waves in caves formed by the Punkwa River near the city of Blansko (see Geophys. . 56).--W. Ayvazoglou.

(3116) PROSPECTING FOR ANTHRACITE BY THE EARTH-RESISTIVITY METHOD

By Maurice Ewing, A. P. Crary, J. W. Peoples, and
J. A. Peoples, Jr.

Am. Inst. Min. and Met. Eng., Technical Publication 683, 1936, 36 pp.

Earth-resistivity measurements on five projects in the Pennsylvania thracite field are described. The outcrops of anthracite seams were lo- ted and traced by means of the low values of resistivity associated with em. Many of the seams located by resistivity measurements have subsequently en proved by drilling and in some instances by actual stripping operations. all cases thus tested the conclusions based on the electrical surveys have en verified.

Laboratory measurements of resistivity of samples of coal and rock are scribed. For samples taken from the region in which field work was done e coal showed much lower resistivity than that of the rocks, as would be pected from the field measurements. For samples of coal taken from points rther west the resistivity was much greater. For this reason it is prob- le that prospecting by the earth-resistivity method would be more difficult the western portion of the field.--Author's abstract.

5. RADIOACTIVE METHODS

(3117) THE MEASUREMENT OF COSMIC RAY SHOWERS BY MEANS OF GEIGER-MÜLLER COUNTERS

By C. G. Montgomery and D. D. Montgomery

Journal of the Franklin Institute, Lancaster, vol. 221, no. 1, 1936,
pp. 59-64.

A mathematical discussion of the question, indicating a basis for the rmulation of experimental shower data obtained by means of Geiger-Müller unters, is given. The authors express the hope that the application of eir considerations will facilitate the solution of the problem of cosmic ay showers.--W. Ayvazoglou.

(3118) EMANATIONSGEHALT DER BODENLUFT UND UNTERGRUNDTEKTONIK

(EMANATION CONTENT OF SOIL-AIR AND UNDERGROUND STRUCTURE)

By H. Israel-Köhler and F. Becker

Naturwissenschaften, Berlin, vol. 23, no. 48, Nov. 29, 1935, p. 818.

This is a preliminary notice on a paper to be published soon, in which various correlations between the structure and emanation from the ground will be discussed theoretically and their application will be examined in a series of measurements made by the authors as well as other scientists. Mathematica deductions are based on the supposition that the distribution of the emanatio results exclusively from diffusion; the possibility of a direct gas flow is temporarily excluded.

The following two cases are mathematically discussed:

1. The normal case, that is, when distribution of the emanation begins to be practically constant at a depth of 5 meters; and 2. The case of the disturbed underground structure.

From the results of a great number of horizontal and vertical profiles of emanation from the ground, the authors conclude that the importance of this method of prospecting lies in the first place in qualitative results; quantitative analyses are possible with great restrictions only.

Reliable results could be obtained in taking into consideration the influence of air pressure upon depth profiles. Inversely, the value of the diffusion coefficient of emanation could be derived from the known structure of the underground.--W. Ayvazoglou.

(3119) MESSUNGSERGEBNISSE DER ULTRASTRAHLUNG AUF FRANZ-JOSEFS-LAND

(RESULTS OF MEASUREMENTS OF ULTRARADIATION ON FRANZ JOSEF LAND)

By J. Scholz

Gerlands Beiträge zur Geophysik, Leipzig, vol. 45, no. 4 1935, pp. 377-380.

The author gives some results of his measurements of ultraradiation carried out during the International Polar Year, 1932-33, on Franz Josef Land with Kolhörster's apparatus. He found that the intensity of radiation was a function of the density of the air.--W. Ayvazoglou.

6. GEOTHERMAL METHODS

(3120) GEOTHERMAL MEASUREMENTS NEAR THE LAKE SUPERIOR COPPER MINES (IN RUSSIAN)

By S. A. Kraskovsky

Priroda (Nature), Leningrad, vol. 24, no. 5, 1935, pp. 18-21, and
Journal of Geophysics, Leningrad, vol. 5, no. 4, 1935, pp. 540-544

A historical outline of geothermal measurements carried out in the Calumet
pper mines since 1895 (A. Agassiz) is given. The methods used and the re-
lts obtained are briefly discussed.--W. Ayvazoglou.

(3121) THERMAL CONVECTION IN THE INTERIOR OF THE EARTH

By Chaim L. Pekeris

nthly Notices of the Royal Astronomical Society, London, Geophysical Supplement, vol. 3, no. 8, 1935, pp. 343-367.

The paper deals with thermal convection in the shell of the earth, caused
various assumed zonal temperature perturbations. One temperature perturba-
on here treated is that due to the difference in the temperature distribution
der a continental crust made up of 10 km of granite on top of 20 km of
saltic material and a suboceanic crust consisting of 25 km of basalt. The
nematic viscosity ν was assumed to be 3 x 10^{21}, as estimated recently by
A. Haskell from a study of the uplift of Fennoscandia after the ice load.
is found that when g, ν, ρ, and α, the coefficient of volume expansion, are
nstant, the velocities and their gradients are proportional to the amplitude
the temperature perturbation and to $(\alpha g/\nu)$, while the stresses are inde-
ndent of the viscosity. The velocities are found to be of the order of 1
/year. The shearing stress exerted by the convective substratum on the
ust is of the order of 10^7 dyn./cm^2, while the normal stresses are about 10
mes larger. The crust is pushed upward under warmer (continental) regions
d pulled downwards under colder (oceanic) regions. The maximum stress-
ifference occurs at the bottom of the crust over the center of the oceans or
ntinents. The surface inequalities are nearly compensated.--Author's
stract.

7. UNCLASSIFIED METHODS

(3122) NEUAUSFUHRUNGEN AUF DEM GEBIETE DER MAGNETISCHEN UND GRAVIMETRISCHEN WAAGEN

(IMPROVEMENTS MADE ON MAGNETIC AND GRAVIMETRIC BALANCES)

By A. Graf

eitschrift für technische Physik, Leipzig, vol. 16, no. 5, 1935, pp. 152-154.

Some essential improvements made during the last years on magnetic and
ravimetric balances manufactured by Askania-Werke are briefly mentioned:

1. The case of the Schmidt's field balance was made so that the vertical and horizontal systems of the balance could be interchanged, the optical reading device was improved, and the sensitiveness to temperature was almost entirely eliminated. 2. A new form of torsion balance with inclined beam was manufactured; this improvement resulted in a shorter time of damping so that twic as many readings could be taken during the same period of time; the weight of the balance was reduced.

Pictures of the new models are given.--W. Ayvazoglou.

(3123) THE SHOESTRING OIL SANDS

By John F, Patton

The Mines Magazine, Denver, vol. 25, no. 12, 1935, pp. 17-23.

The geologic occurrence and the possibilities of tracing the so-called "shoestring sands" with geophysical methods are discussed under the headings: (1) Geographical distribution; (2) Origin of the "shoestring" sands, and characteristics for determining the type of deposit; (3) Methods of tracing the shoestring trends; (4) Composition and character of the sand; (5) Relation of structure to production; (6) Production of the shoestring pools and possibilities of extending them; (7) Application of geophysical methods in tracing shoestring sands.

The author concludes:

> In the application of geophysical methods, as well as in geologic work, it is essential to determine the likely trend from considerations of the type of deposit and make all interpretations in the light of this information.
>
> At the present, I do not think we have any way to measure physical effects of the shoestring sands which would be of sufficient magnitude to locate the sand if its presence was not already expected. However, if the sand is known to exist and we can establish a series of small anomalies in the direction that it would be expected to follow, then our results should warrant further investigation with the drill.--W. Ayvazoglou.

(3124) MITTEILUNGEN ÜBER ERDMAGNETISCHE UND ELEKTRISCHE ARBEITEN IN DER U.D.S.S.R. IN DEN JAHREN 1931-35

(INFORMATION ON THE EARTHMAGNETIC AND ELECTRICAL WORK IN THE U.S.S.R. DURING THE YEARS 1931-35)

By N. W. Puschkow

Terrestrial Magnetism and Atmospheric Electricity, Baltimore,
vol. 40, no. 4, December 1935, pp. 393-399.

According to the author there are at present 18 magnetic observatories i the U.S.S.R., out of which 6 are located in the polar zones. A general magne vey of the country has been started in 1931. Toward the end of 1935 absolute erminations of D, H, and I were made at about 13,000 stations.

Investigations were conducted on the following lines:

1. Secular changes; 2. Investigation of diurnal variations and of magnetic turbances; 3. Theoretical and experimental examination and construction of aratus; 4. Mathematical research; 5. Atmospheric electricity; 6. Propaga-n of radio waves and the ionosphere; 7. Terrestrial currents; 8. Investi-ion of magnetic and electrical phenomena in the Soviet Arctic region.

A list of publications issued by the U.S.R.P. is added.--W. Ayvazoglou.

(3125) ZUR MORPHOLOGIE GEOPHYSIKALISCHER ZEITFUNKTIONEN

(ON THE MORPHOLOGY OF GEOPHYSICAL TIME FUNCTIONS)

By Julius Bartels

zungsberichte der Preussischen Akademie der Wissenschaften, Berlin, no. 30,
Nov. 28, 1935, pp. 504-522.

The first part of the article deals with the "Statistical theory of the ults of geophysical phenomena." Examples are discussed in the second part. translation of author's abstract reads as follows:

> General statistical ideas suitable for the application of series with probability effects, especially time series of cosmic physics, geophysics, and meteorology are introduced. Tendency of conservation and quasi-persistence results in a considerable decrease of the observation material and causes essential changes in the usual methods of statistical observation, as well as in the proof of series. The ideas are explained on examples from geophysics, meteorology and from life tables.--W. Ayvazoglou.

(3126) WERDEN DIE NEUEN ERDÖL-UND ERDGASFELDER IN EUROPA SACHGEMÄSS AUFGESCHLOSSEN?

(ARE THE NEW OIL AND GAS FIELDS IN EUROPE EXPLORED SUITABLY?)

By M. Kämpfer

Bohrtechniker Zeitung, Vienna, vol. 53, no. 4, 1935, pp. 103-105.

The author raises various questions in connection with a proper explora-on of the ground for oil and gas deposits. The conditions necessary to im-ove this situation are discussed and a suggestion is made to collect all the formation already obtained at certain official places, making this informa-on available to everybody. Close cooperation of mining industry with the government geological institutes is recommended. The author concludes that u fortunately the question whether the new oil and gas fields in Europe are explored suitably must at present be answered in the negative.--W. Ayvazoglou.

(3127) DER UNTERBAU DES WIENER BECKENS

(THE SUBSTRUCTURE OF THE VIENNA BASIN)

By L. Waagen

Bohrtechniker Zeitung, Vienna, vol. 53, no. 4, 1935, pp. 93-98, and no. 5, pp
128-132.

The author investigates the results of geophysical prospecting methods carried on in the Vienna Basin since 1919 with the purpose of determining the structural conditions of the subsoil. The results of torsion-balance measurements made by Schumann, Mader, v. Böckh, Petrascheck, and others are discusse in detail, and the author draws the conclusion that, although interesting contributions were added to the knowledge of the substructure, no practical indications for disclosing oil or gas were obtained. In examining the results of Sundberg's geoelectrical methods applied in the Vienna Basin, the author believes that no definite conclusions could be derived from them either. The results of magnetic surveys by Petrascheck and others are also considered of being not sufficiently convincing. The most favorable results were those obtained from seismic investigations.

A list of papers published on geophysical surveys in the Vienna Basin is added.--W. Ayvazoglou.

(3128) BRAZIL'S GEOPHYSICAL PROSPECTING PROGRAM

By Mark C. Malamphy

Mining and Metallurgy, New York, vol. 17, no. 350, 1936, pp. 90-95.

The author examines briefly the geophysical work accomplished up to the present in Brazil and outlines the program of work proposed for the near futu

The organization of the Governmental Geophysical Department, its technic staff, and the instrumental equipment are described. The field work accomplished since the organization of the Geophysical Department in 1932 is mentioned. In conclusion Malamphy describes the field conditions in Brazil and adds a list of official and semiofficial publications issued by the Brazilian Government in which some reference is made to geophysical prospecting in this country.--W. Ayvazoglou.

(3129) GEOPHYSICAL-GEOLOGICAL STUDY OF THE SÃO PEDRO AREA, BRAZIL

By Mark C. Malamphy

Am. Inst. Min. and Met. Eng., Technical Publication 696, 1936, 25 pp.

During the last 15 years, more than 20 unsuccessful tests for petroleum
ve been drilled in the São Pedro area of the State of São Paulo, Brazil.
rious geologists have given both favorable and unfavorable opinions relative
its structure and petroleum possibilities. During 1934 a detailed magne-
meter survey, supplemented by torsion-balance observations, was carried out.

The author has condensed and correlated the geological and geophysical
ta available and concludes that the superficial structures observed by the
ologists are due to igneous intrusions in the form of laccoliths; that these
ccoliths reach their greatest development in the upper part of the Itararé
ries of glacial formations; that the formations which have been domed by the
trusions have been proved incapable of producing petroleum; and finally that
e area offers little prospect for the eventual discovery of petroleum.

The paper is illustrated with geological maps and sections, geophysical
ps and profiles, theoretically calculated anomalies, and examples of depth
lculations.--Author's abstract.

(3130) EARTH-CURRENT OBSERVATIONS AT CHESTERFIELD, CANADA

By B. W. Currie

rrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 40, no. 3,
September 1935, pp. 317-324.

According to the author this summarizes the report on the earth-current
bservations made near Chesterfield Inlet (63° 20' north, 90° 42' west) dur-
ng the International Polar Year, to be published shortly by the Meteorologic-
l Service of Canada. The value of the earth-current data in relation to the
agnetic and auroral observations at Chesterfield is indicated.--W. Ayvazoglou.

8. GEOLOGY

(3131) AGE AND CORRELATION OF SCHIST-BEARING CLASTICS, VENICE AND DEL REY FIELDS, CALIFORNIA

By William H. Corey

Bulletin of the American Association of Petroleum Geologists,
Tulsa, vol. 20, no. 2, 1936, pp. 150-154.

The oil-containing, schist-bearing clastics, on the schist and below the
odular shale of the Venice and Del Rey oil fields, are determined to be of
Upper Miocene age by fossil mollusks found in cores. Emergence of the area in
Vaqueros through Tembler into upper Miocene time, and conformity between the
schist sand and nodular shale, are indicated. They are correlated with Hoots
"basal Modelo graywacke" of Santa Monica Mountains.--Author's abstract.

(3132) HOSKINS MOUND SALT DOME, BRAZORIA COUNTY, TEX.

By Archer H. Marx

Bulletin of the American Association of Petroleum Geologists, Tulsa, vol. 20, no. 2, 1936, pp. 155-178.

Hoskins Mound is a typical Gulf coast salt dome in southeastern Brazoria County, Tex. It has a low topographic mound, roughly circular in outline and characteristic of the intrusion of a salt plug into the overlying Tertiary and later formations found in this region. The salt is capped by anhydrite and limestone, with commercial deposits of sulphur occurring in the limestone on the flanks of the dome. Drilling has well-outlined the cap rock which underlies 400 to 500 acres of the dome area. The sulphur is secondary and later than the anhydrite and limestone.

Since 1923, sulphur mining has been carried on by the method known as the Frasch process, in which superheated water is pumped into the formations and melts the sulphur. The sulphur collects at the bottom of the well and is brought to the surface by means of an air lift. To date, more than 4,000,000 long tons of sulphur have been produced from Hoskins Mound.

Between 1905 and 1915, approximately 500,000 barrels of oil were produced from sands and sandstones immediately above the cap. Only a few off-dome tests have been drilled, and consequently very little information is available in regard to the oil possibilities of the lateral beds abutting the dome.--Author's abstract.

(3133) LATE RECENT HISTORY OF CÔTE BLANCH SALT DOME, ST. MARY PARISH, LA.

By Donald C. Barton

Bulletin of the American Association of Petroleum Geologists, Tulsa, vol. 20, no. 2, 1936, pp. 179-185.

One of the clearest examples of solution of the salt in the Gulf coast is given in the Late Recent History of Côte Blanche. Prior to the uplift of the present topographic mound, solution (of two salt spines?) produced two deep sink holes, in which great thickness of late recent alluvium accumulated. One of the sink holes was uplifted to form the crest of the present topographic mound and shows no effects of subsequent solution. The activity of solution under the other sink hole continued after the uplift of the present topographi mound, possibly to the present. Formation of residual cap rock is not recognized, but is not precluded.--Author's abstract.

9. NEW BOOKS

34) Bonsdorff, J. Verhandlungen der in Leningrad and Moskau vom 12 bis 19 Sept. 1934 abgehaltenen 7-ten Tagung der Baltischen Geodätischen Kommission, Helsinki 1935. (Transactions of the Seventh Meeting of the Baltic Geodetic Commission Held in Leningrad and Moscow from September 12 to 19, 1934, Helsingfors, 1935). The book has 2 parts. Part 1: Minutes and Resolutions; Part 2: Reports. Of interest are: F. Seidel's report on the arrangement for adjusting invard wires made by the Government Surveying Department in Potzdam; S. A. Larionoff's information on the basic measurements in Russia; V. W. Daniloff's lecture on the preliminary results on the methods and instruments for measuring angles in nets of first order; N. E. Norlund's investigations on the accuracy of relative gravity measurements with the pendulum constructed by F. Holweck and P. Lejay; L. W. Sorokin's detailed report on gravity determinations in the Black Sea by the method elaborated by Vening Meinesz; M. Molodensky's discussion on the question of cooscillations of the support during the oscillations of two pendulums; E. Kohlschütter's description of quartz clocks developed by Scheibe and Adelsberger; and E. Warchalowski's investigations on the errors and on the accuracy in making minute levelings.-

135) Coast and Geodetic Survey, U.S. Department of Commerce, R. S. Patton, Director. Progress During December 1935, in Strong-Motion Earthquake Work in California and Elsewhere. 4 pp. During December two strong-motion parties and one vibration party were in the field in California. The earthquake of December 19 was recorded on the 6-inch accelerograph at El Centrao. A preliminary analysis is given in this report.

136) Fleming, John A. Annual Report of the Director of the Department of Terrestrial Magnetism, Carnegie Institution of Washington. Reprinted from Year Book 34 for the year 1934-35, pp. 223 to 267. Issued Dec. 13, 1935. The activities of the department are summarized as follows: 1. Reduction and study of accumulated observational data; 2. Further development of technique and apparatus to record photographically the electrical conditions and variations in the ionosphere, and their investigation and correlation with other geophysical phenomena; 3. Continued theoretical formulation and experimental investigation, in the laboratory, of basic aspects of nuclear physics and magnetism; 4. Maintenance of observational program in the field to make for continuity of secular-variation data and of recording at observatories of the Department the seasonal, diurnal and irregular changes in the earth's magnetic and electric fields. Contents: 1. Investigational and experimental work: (a) terrestrial magnetism; (b) terrestrial electricity; (c) investigation of the ionosphere; (d) magnetism and experimental physics; 2. Field work and reductions: (a) Land magnetic survey; (b) Observatory work; 3. Oceanographic reductions; (a) physical and chemical results; (b) biological results; 4. Instrument shop; 5. Miscellaneous activities; 6. Bibliography; 7. Personnel.

(3137) Kerjci-Graf, Karl. Oelgeologie und Grundlage einer Methodischen Lagerstätten-Suche .(Oil Geology and Foundation for a Systematic search of oil deposits). Neues Jahrbuch fur Mineralogie, Geologie und Paläontologie, Abt. B. Stuttgart, 1934, pp. 165-210. Ferdinand Enke Verlag. This is a most important paper giving numerous examples of oil deposits from the comparison of which some laws on the occurrence of oil may be derived.

(3138) Krenkel, E. Geologie Afrikas (Geology of Africa), Part 3, Geologie of the Earth. Berlin, Gebrüder Borntrager, 1934, pp. 1003-1304, diagrams, charts, maps, tables. This treatise on the geology of Africa in intended to provide an account of its geological features and a discussion of the geochemical and geophysical forces that have produced them.

10. PATENTS

(3139) METHOD AND APPARATUS FOR DETERMINING THE FORCE OF GRAVITY

Paul P. Stoutenburgh, Washington, D.C.

S. Patent 2032381 Issued Mar. 3, 1936.

This invention relates to an apparatus for determining the force of gravity, piezo-electric crystal, a gravity-sensitive element associated with said crys- l and arranged to mechanically stress said crystal as a function of the force gravity, means for sustaining oscillations in said crystal which vary in fre- ency as a function of the mechanical stress applied to said crystal, and means r measuring the frequency of the oscillations sustained in said crystal to de- rmine the force of gravity.

Claims allowed - 3.

(3140) METHOD AND APPARATUS FOR MEASURING DEPTHS

Edwin E. Turner, Jr., West Roxbury, Mass.,
Assignor to Submarine Signal Co.,
Boston, Mass., a corporation of Maine

S. Patent 2033160 Issued Mar. 10, 1936.

This invention relates to a system for measuring depths including an impact riker for generating a single sharp sound impulse after reflection from the ject or surface whose depth is to be measured, an indicator, and means for erating said indicator comprising a receiving circuit interposed between said ceiver and said indicator and having a thermionic three electrode control lve, the grid of which is provided with a biasing potential adjusted for the eration of the circuit just above the noise level.

Claims allowed - 12.

(3141) METHOD OF PROSPECTING FOR DEPOSITS

Central Scientific-Research Insti-
tute of Geological Prospecting,
Moscow, U.S.S.R.

ssian Patent 45363 Issued Dec. 12, 1935.

This invention relates to geophysical prospecting for deposits the magnetic nductivity of which depends on the field voltage, for example, of chromite and on ores. The method consists of recording the oscillograms of the current and the sinusoidal electromotive force affixed to a frame placed on the ground; e existence of the ore is determined from the deviation of the form of the rrent curve from the form of the voltage curve.

Claim allowed - 1.

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A. No. 85. May 1936

DEPARTMENT OF THE INTERIOR
UNITED STATES BUREAU OF MINES
John W. Finch, Director

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GEOPHYSICAL ABSTRACTS
MINING DIVISION

ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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1. GRAVITATIONAL METHODS

(3142) ON THE CHANGE OF GRAVITY IN CONNECTION WITH GEOTECTONIC MOVEMENTS IN THE CAUCASUS, DEPENDING ON LARGE PERIODS OF TIME (IN RUSSIAN)

By M. S. Abakelia

Problems of Soviet Geology, Moscow, vol. 6, no.2, 1936, pp. 117-122

The author attempts to show the relationship between gravimetrical conditions and geological structure in the Caucasus. The existing relationship may be established by comparing the geological, gravimetrical, and macroseism data known at the present time. The four large geotectonic units of the Caucasus and their influence in the history of geotectonic development of the Caucasus are examined. A table of the results of gravimetrical and pendulum determinations is given. The necessity of repeating pendulum measurements at certain points is emphasized. - W. Ayvazoglou.

(3143) CRUSTAL WARPING IN THE UNITED STATES

By E. A. Glennie

Gerlands Beiträge zur Geophysik, Leipzig, vol. 46, no. ½, 1935, pp. 193-197

Isostatic anomalies in the United States and southern Canada are examine and a marked relation between them and latitude and elevation is found. The correlation with height appears to be quantitatively similar to that found in India. It is concluded, therefore, that the warp anomalies, which have prove useful in India, will also effectively portray the tectonic structure in the United States, and the method by which they may be derived is given. - Author's abstract.

(3144) BERECHNUNG DER RELATIVEN GEOIDHEBUNG INFOLGE DER MASSEN VON TIBET UND HIMALAJA

(CALCULATION OF THE RELATIVE GEOID LIFTING BY THE TIBET AND HIMALAYA MASSES)

By K. Mader

Gerlands Beiträge zur Geophysik, Leipzig, vol. 46, no. ½, 1935, pp. 130-141

The partial lifting of the geoid caused by the masses of the Tibetan plateau and Himalayan Mountains is calculated with and without assumptions of isostasy. - Author's abstract.

(3145) NOUVELLES DETERMINATIONS DE LA GRAVITE AU TONKIN AU LAOS ET EN ANNAM

(NEW GRAVITY DETERMINATIONS IN TONKIN, LAOS, AND IN ANNAM)

By Pierre Lejay

Comptes Renders de l'Academie des Sciences, Paris, vol. 202,
no. 5, 1936, pp. 362-365

The values of gravity obtained at 55 stations are summarized in a table.
/. Ayvazoglou.

2. MAGNETIC METHODS

(3146) WEST WIT. AREAS AND GEOPHYSICAL MAGNETOMETRIC INVESTIGATIONS

Editorial note

uth African Mining and Engineering Journal, Johannesburg, vol. 46, no 2244,
1936, pp. 721-724

This note is written in connection with Rudolf Krahmann's paper entitled he Geophysical Magnetometric Investigations on West Witwatersrand Areas tween Randfontein and Potchefstroom, Transvaal," presented by him at the int general meeting of the Geological Society of South Africa and the emical, Metallurgical, and Mining Society of South Africa, held at Kelvin use, Johannesburg. The object of Krahmann's paper was to give an account geophysical magnetometrical prospecting carried out on the southwesterly tension of the Witwatersrand goldfields. The paper is divided into three apters: (1) Geophysical Investigations; (2) Physical Interpretations; d (3) Geological Deductions.

Eight completed boreholes and nine boreholes now being drilled were ted by means of the magnetometric investigations. In view of the good sults obtained, Krahmann states that the magnetometric method of applied ophysics used in close cooperation with geological investigation has monstrated the practicability of tracing the Main Reef series under heavy ver throughout a large area that is of great potential economic value and ere other methods have been unavailing in the past. - W. Ayvazoglou.

(3147) MAGNETOMETRIC SURVEYING

By Bernard Happé

Mining Magazine, London, vol. 54, no. 2, 1936, pp. 83-85.

In a previous article under the same title (see Geophys. Abs. 81, p. 673), the author dealt with a simple method of magnetic interpretation based only on the form and position of the body giving rise to the effect measured. While satisfactory results were obtained in the interpretation of data due to irregular masses, such as orebodies, dykes, and intrusive masses, it was not easy to apply the method to cases in which the magnetic effects are due to stratified formations or to deposits of lenticular form, owing to the difficulty of distributing the induced polarity in a suitable manner. The present article deals with an expansion of the former method. The method is intended to supplement that given previously. The theoretical basis of the method is discussed. - W. Ayvazoglou.

(3148) PROBLEMS OF GEOLOGICAL INVESTIGATION ON THE RAND

Editorial Note

South African Mining and Engineering Journal, Johannesburg, vol. 46, no. 2242, 1936, pp. 663-665

This article gives a review of R. S. G. Stokes' paper on "Recent Developments in Rand Mining Practice," in which the problems faced by the exploratory companies prospecting Rand formations are discussed. The rapidly expanding geophysical surveying, especially by magnetic method, is mentioned. Seismic refraction methods and electric resistivity methods so far have been applied experimentally only, and the application of gravitational methods is under discussion. - W. Ayvazoglou.

(3149) CONDUCTING LAMINAE IN PERIODIC MAGNETIC FIELDS

By McG. Bruckshaw

Proceedings of the Amer. Phys. Society, vol. 48, Jan. 1, 1936, pp. 63-73

The secondary magnetic field, due to conducting circular discs placed in a spatially uniform magnetic field which alternates with time, is measured and it is found that as the dimensions of the disc, the conductivity, and the frequency increase, the secondary field also increases and the phase-differen between the secondary field and the primary field changes from $\pi/2$ to 0. Simple considerations show that these features appear for all conductors or conducting laminae of similar shape, no matter how they are excited. The results are applied to the practical case of the location of good-conducting mineral lodes beneath the earth's surface. - Author's abstract.

(3150) GEOPHYSICAL SURVEYING WITH AN OSCILLATING MAGNETIC NEEDLE

By R. McAdam

Transactions of the Mining Institute of Scotland, General Meeting at Glasgow, Dec. 18, 1935, vol. 56, part 3, pp. 68-78

The author describes a new method of magnetic surveying by an instrument called an "oscilloscope." (The paper was published also in Colliery Guardian, London, vol. 151, no. 3912, Dec. 20, 1935, pp. 1127-1129; see Geophys. Abst. 84.) - W. Ayvazoglou.

(3151) GEOPHYSICAL SURVEYING WITH AN OSCILLATING MAGNETIC NEEDLE

By R. McAdam

nsactions of the Institution of Mining Engineers, London, vol. 40, no. 5,
Feb. 1936, pp. 259-269

According to the author, this paper introduces a new method of geo-
netic surveying based on an old principle of magnetism, namely, that the
e of oscillation of a freely-suspended magnetic needle varies inversely
the square root of the intensity of the horizontal component of the sur-
nding magnetic field. A simple instrument is described and the results
a few actual surveys are given, proving that with this inexpensive instru-
nt, called an "oscilloscope," it is possible to undertake geomagnetic sur-
ys satisfactorily.

Fundamental principles and the construction of the oscilloscope are
scribed and its practical application is examined on the measurements of
gnetic anomalies obtained in E-W traverses across the Pentland Fault. The
cations of Pentland Fault and of the Prestongrange Dyke are shown in maps.
W. Ayvazoglou.

3. SEISMIC METHODS

(3152) PROBLEMS AND PROGRESS ON THE GEOLOGICO-SEISMOLOGICAL FRONTIER

By James B. Macelwane

Science, Lancaster, vol. 83, no. 2148, Feb. 28, 1936, pp. 193-198

In this address, delivered at a joint session of the section of Geology
d Geography of the American Association for the Advancement of Science and
e Seismological Society of America, St. Louis, December 30, 1935, the author
tlined the progress of the geologists and seismologists as two converging
roups of explorers advancing towards a common solution.

He concludes that "the entire picture of positive geological results at-
ined by seismological methods, of the new problems thus realized and formu-
ated, and of the better understanding and readiness to cooperate which is
videnced in the ranks of geologists and of seismologists, is a most encourag-
ng one and foreshadows a new and exceedingly interesting era of geologico-
eismological research." - W. Ayvazoglou.

(3153) RECENT ADVANCES IN SEISMOLOGY

By F. J. W. Whipple

Nature, London, vol. 136, Nov. 16, 1935, pp. 782-784

After referring to Jeffreys' and Bullen's revised travel-time tables, the occurrence of earthquakes with deep foci (up to 400 km) is discussed and their distribution across Japan shown, whence the existence of faults extending to similar depths is inferred. - C.A.S. Science Abstracts, vol. 39, no. 457, 1936.

(3154) A SEISMOLOGIC STUDY OF THE KILAUEA ERUPTION 1931-1932

By Austin Emery Jones

University of Hawaii, Research Publications, Honolulu, no. 9, 1935, 60 pp.

A seismicity curve is drawn for the period of a year preceding and a year following an eruption of Kilauea. The curve indicates the times of beginning and ending of the study. The earthquakes before, during, and after the eruption are located graphically on two maps with the aid of curves recently developed for the Island of Hawaii. While no corrections to the curves are found, the probable accuracy of the epicenters is indicated by the instrumental directions. The macroseismic effects of a premonitory earthquake are described. A study of the depths of foci is combined with a study of the ground movement directions of a few of the located quakes. A list of all seismic disturbances noted on the seismograms during the period studied is appended. The correspondence of seismicity peaks with lunar phases gives possible periods of rising and sinking crust. - Author's abstract.

(3155) ERFOLGREICHE ANWENDUNG DES SEISMISCHEN REFLEXIONSVERFAHRENS IM RUHRBERGBAU

(SUCCESSFUL APPLICATION OF SEISMIC-REFLECTION METHOD IN THE RUHR MINING INDUSTRY)

By H. Lückenrath

Glückauf, Essen, vol. 72, no. 10, 1936, pp. 236-238

The author gives a description of a seismic-reflection method of prospecting applied in Walsum-mines (lower Rhine) for finding the depth of the carboni erous horizon and especially for determining the depths and the directions of the post-carboniferous dislocations in the upper part of the earth's crust.

Three main reflecting horizons were established: The chalk horizon, the varigated sandstone horizon, and the zechstein layer. The depths and inclinations of the reflecting surfaces were determined.

Two profiles and one plan showing the results of the measurements and the course of the dislocation are given. - W. Ayvazoglou.

4. ELECTRICAL METHODS

(3156) USE OF ELECTRICAL LOGS FOR CORRELATION IN THE GULF COAST OF TEXAS AND LOUISIANA

By Alexander Deussen and Eugene G. Leonardon

American Petroleum Institute, Section IV, Los Angeles, Proceedings
Sixteenth Annual Meeting, Nov. 11-14, 1935,
vol. 16, pp. 13-20

The purpose of the present paper is to discuss and to illustrate by means a few examples the use of the Schlumberger electrical logs for the purpose establishing geological correlation. These surveys are now widely used in e Gulf Coast of Texas and Louisiana for this purpose and supplement effica- ously the lithological and paleontological conclusions. As is known, they e based on the measurement of two electrical data - the electrical resis- vity and porosity of the formations. In a large number of practical cases e use of one diagram alone affords little means of establishing satisfactory rrelations, while the harmonious combination of both data constitutes a ch more powerful tool of analysis. - Author's abstract.

(3157) THE ELECTRIC CURRENT-SYSTEMS OF MAGNETIC STORMS

By S. Chapman

rrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 40, no. 4,
Dec. 1935, pp. 349-370

Magnetic disturbance is due to electric current-systems above the earth's rface and to secondary induced currents within the earth. The location of e external currents cannot be uniquely inferred from magnetic observations de at the earth's surface. Additional considerations are required to resolve is difficulty; knowledge of the distribution of ionized gas above the earth, ch as radio observations afford, is one principal means, while another is e a priori probability that the current system is fairly simple. The question ether or not the currents flow wholly in the atmosphere is discussed, and it concluded, though not decisively, that the evidence favors this view. The rength of the various parts of the current-system is evaluated, and, among her results, it is shown that on days of moderate magnetic storm the total ditional electric current flowing westward round the globe, between the rth and south poles rises to 750,000 amperes. - Author's abstract.

5. RADIOACTIVE METHODS

(3158) THORIUM CONTENT OF ROCKS

By W. D. Urry

Journal of Chem. Phys., vol. 4, Jan. 1936, pp. 34-39

A new method for the determination of thorium in quantities of the order of 10^{-5} to 10^{-6} g is employed to complete the data necessary for the calculation of the age of geological material. The α-particle activity of thoron in a streaming gas is measured with a counter, a procedure which is shown to be superior to the usual measurements on the thoron deposit. Simultaneously the $Pa/_{Ra}$ ratio in common rocks can be determined. - Author's abstract.

(3159) RADIUM CONTENT OF ROCKS

By W. D. Urry

Journal Chem. Phys., vol. 4, Jan. 1936, pp. 40-48

The determination of the age of common rocks by the "helium method" necessitates accurate measurements of the radium content. The method of compensating the background by the use of two opposed ionization chambers is applied to radium determinations and the apparatus has an observational limit of $5.5 \times 10^{-14} \times n^{-\frac{1}{2}}$ g radium for n hourly readings. With the Th content determined as above (see preceding abstract), results for a suite of rocks from a single horizon and the present status of a geological time scale are given. - Author's abstract.

(3160) THE LIVING GLOBE

By B. Willis

Science, Lancaster, vol. 82, Nov. 8, 1935, pp. 427-433

The effects of radioactive heating in the earth are rediscussed. The author points out that the usual assumption that radioactive elements are uniformly distributed either near the surface or in some postulated shell of the earth is unreasonable. Any theory of the origin of the earth seems to involve the deposition of the heavier elements, i.e., metals, at the core. One must expect, therefore, that a considerable proportion of the heavy radioactive elements are also concentrated there. The heat produced by their disintegration has gradually melted the center, giving the "inelastic core." And if these elements are not now exhausted by disintegration, the earth may be gradually melting from within outwards. The outer stratificatio of the earth is not easy to account for, but some of the phenomena at least may have been produced by local melting under the influence of heat generated by patchy distribution of radioactive material in the crust. - W.A.R., Science Abstracts, vol. 39, no. 457, 1936.

(3161) SHOWERS OF RAYS WHICH PRODUCE BURSTS OF COSMIC-RAY IONIZATION

By C. G. and D. D. Montgomery

Physical Review, Lancaster, vol. 48, no. 11, Nov. 15, 1935, pp. 786-789

An expression for the probability that a shower of a given number of rays ill discharge a number of Geiger-Müller counters is derived and experimentally erified by observing the bursts of ionization in an ionization chamber and ne simultaneously occurring discharges of three counters placed under the hamber. An estimate is made of the relative importance of the contributions f showers of various numbers of rays to the counting rate of counters placed ut of line. The view that there is no sharp distinction between small showers s observed in cloud chambers and the very large showers which produce the ursts of ionization or "Stösse" in ionization chambers is emphasized. The esults have a significant bearing upon the interpretation of counter experients on showers. - Author's abstract.

(3162) BEOBACHTUNGEN ÜBER DEN DURCHGANG DER ULTRASTRAHLUNG DURCH MATERIE

(OBSERVATIONS ON THE PASSAGE OF PENETRATING RADIATION THROUGH MATTER)

By H. Kulenkampff

hysikalische Zeitschrift, Leipzig, vol. 36, no. 22/23, Dec. 1, 1935, pp. 785-787

Coincidence measurements with counters arranged vertically are carried ut with absorbing sheets placed between and above the counters. The proluction of a secondary corpuscular radiation with a range of about 35 cm of e is established, and the absorption coefficient of the γ-type radiation hich the corpuscular radiation produced in the absorber was found to be .009 cm^{-1} Fe. - Author's abstract, translated by W. Ayvazoglou.

(3163) ZUM ULTRASTRAHLUNGSPROBLEM

(ON THE PROBLEM OF PENETRATING RADIATION)

By P. M. S. Backett

hysikalische Zeitschrift, Leipzig, vol. 36, no. 22/23, Dec. 1, 1936, pp. 773-776

The author gives a review of problems connected with penetrating radiaion. Special reference to shower formations is made. - W. Ayvazoglou.

(3164) UNTERSUCHUNGEN DER IONISATION DURCH ULTRASTRAHLUNG MIT EINER DOPPELKAMMER

(INVESTIGATIONS OF IONIZATION BY PENETRATING RADIATION WITH A DOUBLE CHAMBER)

By W. Messerschmidt

Physikalische Zeitschrift, Leipzig, vol. 36, no. 22/23. Dec. 1, 1935, p. 788

The absorption of Hoffmann collisions was determined by a double ionization chamber. A half-value thickness of 3.5 cm of Pb was found. During the formation of collisions (showers with many particles), a more complicated origin than that of a simple splitting up of an energetic particle of radiation, as is the cause with showers containing a few particles, must be assumed. - Author's abstract, translated by W. Ayvazoglou.

(3165) THE INTENSITY OF ION-FORMATION ACCORDING TO OBSERVATIONS MADE IN KUCHINO (NEAR MOSCOW) (IN RUSSIAN)

By V. I. Baranov and M. D. Kravchenko

Journal of Geophysics, Leningrad, vol. 5, no. 4, 1935, pp. 532-539

The authors give the results of measurements of the amount of ions produced in one square centimeter of air during one minute. The experiments were carried out in Kuchino in 1934. Method and apparatus, developed by Nolan, Boylan, and de Sachy, are described briefly. - W. Ayvazoglou.

(3166) A PROPOSITO DEL METODO ALIVERTI PER MISURE DI RADIOATTIVITA ATMOSFERIC

(ALIVERTI'S METHOD FOR MEASURING ATMOSPHERIC RADIOACTIVITY)

By G. Aliverti

Gerlands Beiträge zur Geophysik, Leipzig, vol. 46, no. ½, 1935, pp. 223-226

The results obtained by the author's apparatus have to be corrected by factors 1.10 and 1.17 for d.c. and a.c., respectively. This agrees for d.c. with the work of Illing and Malek using a similar apparatus, but their correcting factor for a.c. is 1.99. To test the accuracy, the author uses two consecutive identical pieces of apparatus and comes to the conclusion that (except for radon) there are no radioactive atoms in the atmosphere. He points out the sources of error in Illing and Malek's apparatus and concludes that his own gives a quick and sufficiently accurate measurement of the radon content of the air. - H.M.B., Sci. Abst., vol. 39, no. 458, 1936.

(3167) EFFECT OF RAINFALL ON IONIZATION REGISTERED BY RECORDING COSMIC METER WITH TOP SHIELD REMOVED

By Richard L. Doan

oceedings, American Physical Society, Baltimore meeting, Nov. 29-30, 1935

Author's abstract of this paper presented at the Baltimore meeting is blished in The Physical Review, vol. 49, no. 2, 1936, p. 198. It reads as llows: "Several recording cosmic-ray meters operated with bottom shielding ly have shown pronounced increases of ionization during thunderstorm periods. vestigation has shown these increases to be associated with rainfall and t with atmospheric electrical discharges. The excess ionization starts at e beginning of the rain and continues for an hour or more after the pre- pitation has stopped, thus indicating an appreciable life for the responsible nizing agent. Simultaneous tests with two meters, one with no top shield d the other shielded from above with 1 cm of lead, indicate an absorption efficient for the radiation about equal to that of gamma rays, from which is concluded that the effect is largely due to RaB and RaC brought down th the raindrops from the upper atmosphere. The radioactivity of freshly llen rain was first observed by C. T. R. Wilson in 1902, and the effect ported here is doubtless of a similar nature. Such rapid changes in atmos- eric radiation emphasize the importance of using heavy shields in making smic-ray observations."

168) FURTHER INVESTIGATIONS OF THE ATMOSPHERIC IONIZATION ASSOCIATED WITH RAINFALL

By G. R. Wait and A. G. McNish

oceedings, American Physical Society, Baltimore meeting, November 29-30, 1935

Authors' abstract of this paper presented at the Baltimore meeting of e American Physical Society, as published in the Physical Review, vol. 49, . 2, 1936, p. 201, reads as follows:

"Investigations conducted during the past summer on the ionization pro- ced in the atmosphere by rainfall confirm the findings previously reported the authors (Monthly Weather Review, vol. 62, pp. 1-4, January 1934, and ys. Rev., vol. 45, p. 750, 1934) that the increased ionization is caused by dioactive matter, principally RaB and RaC, brought down to the earth by the in. Coating the thin-walled ionization chamber used in the earlier investi- tions with paraffin sufficiently thick to stop alpha particles caused the fect during thunderstorms to be diminished. The diminution was from 40 to ion-pairs per cc per second in the chamber per inch of rain, values refer- ing to accumulated rates. The first number is due to the combined effects alpha, beta and gamma radiation, while the second is due to beta and gamma diation alone. Considering a uniform distribution of RaB and RaC in the ee atmosphere, the ratio of the ionization due to alpha, beta, and gamma diation to that due to beta and gamma radiation alone should be 6 to 1.

Evidence is presented to show that the radioactive substances brought down by the thunderstorm rain are not caught by the drops while falling, as hypothesized by C. T. R. Wilson, but are accumulated in the thundercloud into which they are carried from the earth by ascending air currents associated with the formation of thunderstorms."

(3169) THE MEASUREMENT OF GAMMA-RAY ENERGIES WITH A CLOUD CHAMBER

By J. R. Richardson and F. N. D. Kurie

Proceedings, American Physical Society, Berkeley meeting, Dec. 20-21, 1935

This paper was presented at the Berkeley meeting of the American Physical Society. Authors' abstract published in the Physical Review, vol. 49, no. 2, 1936, p. 209, reads as follows:

"The only reliable method of measuring gamma-ray energies is by the use of a cloud chamber traversed by a magnetic field. The curvature of the tracks of secondary electrons from the radiator is measured. From a frequency distribution of the tracks in radium (strictly in H), one estimates the energy of the gamma-ray. This work tests the resolution and defines criteria for a homogeneous gamma-ray. For radiators composed of light elements, one may neglect photoelectrons and pair production and consider only Compton electrons The relative numbers of electrons ejected at various angles may be computed from the Kelin-Nishina formula. For any given angular range (here taken as within 10° of the direction of the gamma-ray, one may calculate the distribution in energy of the electrons emerging from various depths in the radiator from the known data on the straggling of beta particles. Thus, curves can be constructed which show the energy distribution of these secondary electrons for various thicknesses of radiator. One finds from such an analysis that the best conditions are attained by the use of a thin lamina of the order of 100 mg/cm^2 thick and using only such tracks as emerge within an angle of about 10° with the gamma-ray. In this way, peaks whose half width is about 300 kv can be got for each homogeneous gamma-ray (provided the energy is of the order of 3 MV)."

6. GEOTHERMAL METHODS

(3170) ROCK TEMPERATURES AND DEPTHS TO NORMAL BOILING POINT OF WATER IN THE UNITED STATES

By H. Cecil Spicer

Bulletin, American Association of Petroleum Geologists, Tulsa, vol. 20, no. 3, 1936, pp. 270-279

A table is given showing the highest and lowest extrapolated temperatures in the earth at two given depths for a number of localities. Computed maximum and minimum depths to 212° F. are also given for each locality.

The table is based on the data tabulated in a recent paper by C. E. Van strand ("Temperature Gradients" Problems of Petroleum Geology, August 1934, e Geophys. Abst. 68, p. 1302). - W. Ayvazoglou.

(3171) RESISTANCE PYROMETER FOR MEASURING SUBSURFACE TEMPERATURE

By W. C. Lane

Petroleum Engineer, vol. 7, no. 1, October 1935, p. 54

As a means for determining bottom-hole temperature, a resistance pyrometer s been devised. The pyrometer consists of a spool of no. 31 cotton-covered pper magnet wire, condenser tubes, and no. 12 solid hard-drawn duplex rubber-vered copper wire. Resistance measurements were carried out on a Wheatstone idge. About 1,000 feet of no. 31 wire were wound on a wooden bobbin after coat of insulating compound had been applied. The whole assembly was then ven another coat of insulating compound and covered with a layer of varnished mbric.

A section of brass tubing was then cut and one end closed by brazing a sk of copper in it. A stuffing box was screwed into the other end. The il was then inserted in the tube, the space filled with transformer oil, and e instrument was then calibrated.

In using the device on the heating test, the tube was attached to the rforated pipe just below the pump barrel and leads were carried to the sur-ce. The resistance was measured by means of a post-office type Wheatstone idge. - L.V.W.C., Journ. Inst. Petrol. Techn., vol. 22, no. 147, 1936.

(3172) BORE-HOLE INVESTIGATIONS IN YELLOWSTONE PARK

By Clarence N. Fenner

urnal of Geology, Chicago, vol. 44, no. 2 (part 2), 1936, pp. 225-315

In connection with a study of thermal phenomena of Yellowstone Park car-ed out by the Geophysical Laboratory for several years, two bore-holes were illed in geyser basins. During the progress of this work, temperatures d pressures were measured and observations were made on underground struc-res shown by the cores. Subsequently the cores were studied in the labora-ry by chemical and petrologic methods to ascertain the mineral transformation fected by hydrothermal circulation and their significance.

Structural features, such as porosity and fractures, together with thermal nditions found help to explain the underground circulation. The data enable to picture the manner in which meteoric waters, falling upon adjacent pla-au areas, penetrate to deep levels, are met by magmatic exhalations at high mperature, are diverted upward, and appear at the surface as hot springs and ysers. Light is thrown upon the mechanism of geyser action itself, which found to be a rather more complicated process than has been supposed.

Metasomatic alteration of the rocks has been important. A considerable variety of new minerals has been formed, and the composition has been much changed. The most notable effect found in the cores has been the addition of silica and the molar replacement of soda and lime of the feldspars by potash. The results of this study supplement and confirm those obtained by E. T. Allen in his study of the composition of the thermal springs carried out as part of the same project. From this assembly of concordant data we are enabled to trade out with considerable confidence a series of reactions that apply not only to the rocks rendered accessible by the drill holes but to those at greater depth, and to deduce the manner in which the original magmatic emanations, dissolved in meteoric waters, have modified the composition of the rocks through which they have passed and in turn have been modifie - Author's abstract.

7. UNCLASSIFIED METHODS

(3173) LA GÉOPHYSIQUE EN GULF COAST

(GEOPHYSICS IN THE GULF COAST)

By P. Charrin

La Revue Pétrolifère, Paris, no. 671, Feb. 22, 1936, pp. 321-324, and no. 672, Feb. 29, 1936, pp. 349-357

Charrin gives a summary of the results of geophysical work carried out on the Gulf Coast during the last 10 years under the following items: (1) General conditions; (2) historical outline; (3) possibilities of geophysical prospecting (tables showing the discovery of oil field by non-geophysical methods); (4) number of discoveries made by geophysical methods (tables); (5) character of geophysical domes: producers and non-producers (tables); (6) essential values of geophysical fields (tables); (7) proportion in the total production of geophysical and nongeophysical fields; (8) financial balance of geophysics; (9) activity of geophysical work on the Gulf Coast at the end of 1934 (41 seismic crews; 36 torsion-balance crews; 3 pendulum, 2 gravimetrical, and 4 magnetic crews; a total of 86 crews).

The author concludes that the enormous development of geophysical work in the Gulf Coast may be seen best from the following figures: 69 proved and 40 probable discoveries were made during the eleven years, while only 54 domes and fields were discovered by the old methods during 33 years.

The expenditure of 40 million dollars made in connection with geophysica exploration is certainly justified, taking into consideration the total production, amounting to over two billions of dollars. The number of geophysica crews on the Gulf Coast at the present time is considered to be 95 - 59 reflection, 30 torsion-balance (with 71 balances), and 6 other crews. - W. Ayvazoglou.

(3174) DEVELOPMENT OF GEOPHYSICAL METHODS OF PROSPECTING (IN RUSSIAN)

By A. A. Petrovsky

ademy of Sciences of U.S.S.R., Transactions of the Institute of History of
Science and Technics, Leningrad, no. 2, 1934, pp. 61-80

In this article Petrovsky gives a brief historical outline of the main ages passed by applied geophysics:

1. Pre-scientific period (16th century; Agricola).

2. First steps in geophysical application (18th century; mining compass; ermal measurements by J. F. Daubuisson in the beginning of the 19th century; ectrical investigations by R. Fox in the mines of Cornwall, 1830; seismic vestigations by Mallet, 1848; etc.).

3. Beginning of industrial application of geophysics (brief description f modern instruments; magnetometers, torsion balances, electrical apparatus, ismographs).

4. New geophysical methods (ondometry - see Petrovsky's articles in sts. 25 and 49 - radioactive methods).

A list of reference is added. - W. Ayvazoglou.

(3175) GEOLOGISTS' ANNUAL-MEETING PROGRAM COVERS BROAD RANGE OF SUBJECTS

By L. G. E. Bignell

Oil and Gas Journal, Tulsa, vol. 34, no. 43, 1936, p. 15.

The meeting is to be held in Tulsa, March 19-21, 1936. The final program f the Society of Petroleum Geophysicists is as follows:

B. Gutenberg - Some theoretical problems concerning the seismic method.

M. M. Slotnik - On seismic computations II.

E. E. Blondeau - Earth-temperature measurements over two known structures.

L. A. Burrows - Relation between firing current and performance in ismograph caps.

L. D. Leet - A refraction and reflection fan to 187.8 km.

B. B. Weatherby - The organization of an effective exploration department.

D. C. Barton - The Crosbyton anomaly.

C. E. Van Orstrand - Geothermal methods of estimating the age of the rth.

T. I. Harkins - Geophysical history of Darrow salt dome.

T. I. Harkins - Geophysical history of the Mykawa oil field.

J. H. Wilson - A recommended program for the exploration of the Great Plains.

Frank Rieber - Controlled directional sensitivity; a method for adapting reflection methods to complex structures.

J. Brian Eby - Magnetic survey of southern Alabama.

J. B. Macelwane - Absolute and relative energy relations in the reflection and refraction of elastic waves.

C. E. Van Orstrand - Geothermal gradients in the Oriskany Sand in New York, Pennsylvania, and West Virginia.

P. W. Klipsch - Some aspects of multiple recording.

A. B. Bryan - True ground motion from mechanical seismograph records.

Louis Statham - Electrical earth transients in geophysical prospecting.

F. J. G. Neumann - Torsion-balance surveying in inundated areas.

J. M. Ide - Laboratory determination of elastic constants.

L. Y. Faust - Optimum geophone spreads for reflection surveys.

E. A. Eckhardt - Comparative torsion balance and gravimeter survey.

E. E. Rosaire - The growth of company-owned operations in geophysical prospecting since 1930.

L. J. Neuman - The divining rod.

Frederic A. Tompkins - Effect of development time and developer temperature on the production of photographic seismograph records.

C. A. Heiland - Notes on reflections from steeply dipping beds.

J. Barad - Significance of some fundamental properties of explosives with special reference to geophysical prospecting.

R. R. Thompson - The seismic electric effect, and its use in recording seismic waves.

M. M. Slotnik - A simplified circuit of the seismic-electric method and its steady state solution.

N. G. Johnson and G. H. Smith - Explosives for seismic prospecting.

L. D. Leet - True horizontal displacements near a five-ton blast.

C. C. Morgan - Geophysical studies in Antarctica.

(3176) HOW PHYSICS IS APPLIED IN THE OIL INDUSTRY

By Paul D. Foote

Physics, Lancaster, vol. 7, no. 3, 1936, pp. 91-96

In discussing the application of physics in the oil industry, the author stinguishes the following four main phases: (1) Discovery of oil fields;) drilling; (3) production; and (4) marketing.

The first phase is that concerning geophysics, the problem being to find ried structures at depths down to two miles and more when there is no sus-cion of the presence of oil from surface indications. The three fundamental thods of geophysical prospecting - the gravitational method, the magnetic thod, and the seismic method - are examined. Here, according to the author, ysics must be applied in the form of devising most practical methods and struments for accurately measuring the effects produced by the structure on the various instruments at the surface and by developing the technique r rapidly and economically interpreting the field data in terms of geologic ructure. The possibilities of the different methods are examined. - W. vazoglou.

8. GEOLOGY

(3177) ORIGINS OF PETROLEUMS; CHEMICAL AND GEOCHEMICAL ASPECTS

By Benjamin T. Brooks

Bulletin, American Association of Petroleum Geologists, Tulsa, vol. 20, no. 3,
1936, pp. 280-300

The survival of organic material in oil shales of great geological antiquity is evidence against the assumption that petroleums have been formed by th heat decomposition of organic material. Another evidence of the low-temperatu history of oil shale is the discovery of Treibs that many shales, asphalts, an asphaltic petroleums contain chlorophyll porphyrins. The fact that many petro eums contain complex labile substances easily decomposed by heat may indicate that cellulose, peats, and coals are progressively carbonized under pressure and during geologic time at temperatures much lower than has heretofore been assumed. The carbon-ratio theory has only a negative value in relation to petroleum occurrence.

Some bottom-hole temperatures in producing fields do not exceed 100°F., and are in strata only slightly arched or otherwise disturbed.

The conclusion seems warranted that organic materials as stable as the paraffins and some waxes, once formed and sealed in the sedimentary rocks, normally undergo no further changes due to the influence of heat.

The principal types of organic substances which are to be considered as the main source material for petroleum include cellulose, starches, and sugars proteins, lignins, oleo-resins, waxes, and fatty oils. Fatty oils are to be regarded as the principal source material.

Putrefactive decomposition of organic matter is recognized as an initial step in the formation of petroleum. At present the depth at which bacterial action ceases is not known.

The low-temperature history of petroleum favors the view that the hardening of sedimentary rocks is due entirely to compaction and the deposition of cementing material from solution.--Author's abstract.

9. NEW BOOKS

178) Carnegie Institution, Washington, D.C. Seismology. Reprinted from Carnegie Institution Year Book no. 34, 1934-35, pp. 360-370, issued December 13, 1935. This is a report of the advisory committee in seismology concerning the following questions: (1) Collaboration with the U.S. Coast and Geodetic Survey (information furnished by N. H. Heck); (2) geodetic work in regions of seismic activity (information furnished by W. Bowie); (3) the seismological laboratory (extracted from the annual report of H. O. Wood); (4) earthquake activity (by C. F. Richter); (5) development of instruments (by Hugo Benioff); (6) portable seismograph assembly (the design and construction of a new form of electromagnetic seismograph is being carried on in cooperation with the California program of the U.S. Coast and Geodetic Survey; the assembly is briefly described); (7) publications (list of published papers is given).

179) Coast and Geodetic Survey, Washington, D.C. Magnetic declination in Florida, 1935, Serial 564, 1935, 37 pages. Contents: 1. Introduction. 2. Definitions of terms. 3. Compass surveying. 4. Explanation of tables and chart. 5. Public-land surveys. 6. Bibliography. 7. Tables.

180) Congrès International des Mines de la Métallurgie et de la Géologie Appliquée, Paris, October 1935. The seventh session of the International Congress of Mining, Metallurgy, and Applied Geology was held at Paris from October 20 to 26, 1935. For papers presented at the geophysical section see Geophysical Abstracts 81, p. 1687.

181) Lambert, Walter D., and Darling, Frederic W. Tables for determining the form of the geoid and its indirect effect on gravity. Coast and Geodetic Survey, U.S. Department of Commerce, Washington, D.C. Special publication 199, 130 pp., 1936, price 15 cents. Part I. - Fundamental tables. Part II. - Density of compensation for computing special Bowie tables. Part III. - Bowie isostatic reduction tables. Part IV. - Determination of geoid from gravity anomalies. Appendix. - Miscellaneous tables.

182) Stočes, B., and White, C. M. Structural Geology. With reference to economic deposits. 460 pages and 663 figures. London: Macmillan and Co., London, 1935. Price 25s. net. The text is divided into two parts dealing, respectively, with the primary structures of rocks and induced or secondary structures due to orogenic movements of the earth's crust. There are also sections on surveying and mapping, on geophysical methods of prospecting for minerals, and on the influence of structure in mining practice.

10. PATENTS

(3183) SEISMIC METHOD FOR PROFILING GEOLOGIC FORMATIONS

Burton McCollum, Houston, Tex., Assignor,
by mesne assignments to the Texas Company, a corporation of Delaware.

U.S. Patent 2021943 Issued Nov. 26, 19

This invention relates to the method of making a profile of a subterranea formation that consists in producing seismic waves at an origin point in the earth's substance adjacent said formation; recording the time of travel to spaced loci substantially vertically in line with said origin point of waves traveling in paths to and reflected from surface points on said formations; recording the time of travel of said waves from the origin point directly to sai loci; locating elliptical arcs, each in the same plane and at the same side of said loci, and each having the origin point as one focus and one of said loci as the other focus, with the corresponding path as a summation of the radii; and locating said profile tangential to said arcs.

Claims allowed - 3.

(3184) METHOD FOR ELECTRICALLY PROSPECTING THE UNDERSOIL

Marcel Schlumberger, Paris, France, assignor
to Compagnie Générale de Géophysique, Paris, France,
a corporation of France.

U.S. Patent 2034447 Issued March 17, 1

This invention relates to a method of electrically prospecting the unders which comprises measuring the differences of potential produced by telluric cu rents between any two points of the surface of the ground at times when the telluric currents have a given direction; making similar measurements at the sa times between two points of said surface chosen for comparison; and comparing first measurements with the measurements between these two last-mentioned poin

Claims allowed - 11.

(3185) IMPROVEMENTS IN OR RELATING TO PENDULUMS

Naamlooze Vennootschap de Bataafsche Petroleum
Maatschappij, of 30, Carel van Bylandtlaan,
The Hague, Holland, a body corporate, organized
under the laws of Holland, Assignees of Fernand Holweck,
of 6, Rue Adolphe Facillon, Paris, France.

British Patent 426041 Issued March 26, 1

This invention relates to a pendulum apparatus for determining gravitatio forces in which the pendulum is supported by means of an elastic blade, charac-

rized in that the said blade is formed integral with a base for fixing the
ie and with a chuck for the pendulum rod from a single piece of material, the
iter of gravity of the movable part lying in the plane of the blade.

Claims allowed - 9.

(3186) IMPROVED TORSION BALANCE

Naamlooze Vennotschap de Bataafsche Petroleum
Maatschappij, of 30, Carel van Bylandtlaan,
The Hague, Holland.

itish Patent 426179 Issued March 28, 1935

This invention relates to a torsion balance according to Eötvös, wherein
e horizontal distance between the weights is so small that the oscillation
riod amounts to less than one minute and the beam can be placed within a hous-
g of cylindrical or similar simple shape, and wherein means are provided to
iminate the influence of micro-seismic terrestrial vibrations from the regis-
ations, said means comprising either a system of registration insensitive to
e oscillations of short period caused by the vibrations of the earth and re-
ting only to the medium position determined by the field of gravity about
ich these oscillations are effected, or means that render the pendulum itself
sensitive to the said vibrations.

Claims allowed - 8.

(3187) IMPROVEMENTS IN APPARATUS FOR DISTANCE AND DEPTH MEASUREMENTS

Submarine Signal Company, a corporation, organized under the State of
Maine, of 160 State Street, Boston, Mass., U.S. of America,
assignees of Edwin E. Turner, Jr. Engineer, of 130 Willow Street, West
Roxbury, Mass., U.S. of America.

itish Patent 434554 Issued Sept. 4, 1935

This invention relates to a system for measuring distances and depths by
e echo method, in which signal impulses are emitted periodically and the im-
lses reflected from the object whose distance is being measured are received
gether with other impulses in the signalling medium with the object of indi-
ting the moment of receipt of the reflected impulses and the measurement of
e time interval between the emission of an impulse and the receipt of its
flection characterized by the fact that means are provided in the receiving
rcuit for automatically restricting the operation of the indicator to the in-
cation of impulses having an intensity which is greater or not substantially
ss than that of the maximum intensity of the impulse having the greatest peak
lue received during the preceding time interval.

Claims allowed - 12.

G.A. 85

(3188) A METHOD AND APPARATUS FOR EXAMINING THE VARIOUS STRATA TRAVERSED BY A WALL

Naamlooze Vennootschap de Bataafsche Petroleum
Maatschappij, of 30, Carel van Bylandtlaan,
The Hague, Holland.

British Patent 435676 Issued Sept. 25, 193

This invention relates to a method of investigating the thermal conductivi of various strata surrounding a well, comprising, in sequence, the introductio into said well of a liquid having a temperature that differs from the temperatu of the strata encountered; the prevention of movement of said liquid during a sufficient time to allow for heat exchange between the liquid and the walls of the well, substantially in accordance with the thermal conductivity of the respective strata; and introducing into said well means adapted to indicate diffe ences between the temperatures actually prevailing at different levels and the temperatures substantially as would prevail at said levels if all strata had t same average heat conductivity, the differences in thermal conductivity of the various strata encountered being measured and utilized for the purpose of strat correlation in well-drilling.

Claims allowed - 5.

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June 1936.

DEPARTMENT OF THE INTERIOR
UNITED STATES BUREAU OF MINES
John W. Finch, Director

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GEOPHYSICAL ABSTRACTS
MINING DIVISION

NOTICE

On July 1, 1936, the Geophysical Section of the U. S. Bureau of Mines was transferred by Act of Congress to the U. S. Geological Survey. Accordingly, this number of "Geophysical Abstracts" will be the last issued by the Bureau of Mines. It is understood that the Geological Survey plans to publish this information annually, instead of monthly as heretofore.

John A. Davis,
Chief Engineer,
Information Division.

A. No. 86

June 1936

DEPARTMENT OF THE INTERIOR
UNITED STATES BUREAU OF MINES
John W. Finch, Director

GEOPHYSICAL ABSTRACTS
MINING DIVISION

ABSTRACTS OF CURRENT ARTICLES ON GEOPHYSICAL PROSPECTING

Compiled by Frederick W. Lee

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1. GRAVITATIONAL METHODS

(3189) CARTE GRAVIMÉTRIQUE DE L'INDOCHINE (GRAVIMETRICAL MAP OF INDO-CHINA)

By Pierre Lejay.

Comptes Rendus de l'Académie des Sciences, Paris, vol. 202, no. 8, Feb. 24, 1936, pp. 609-612

A map drawn by the author based on 97 measurements of gravity is considered by him to be sufficiently complete for drawing general conclusions on the characteristics of gravity in Indochina. The isanomalees follow closely the surface topography and are mostly negative, reaching the values of -120 milligals in the valleys and -150 milligals on the summits. - W. Ayvazoglou.

(3190) THE BOUNDARY PROBLEMS OF POTENTIAL THEORY AND GEODESY

By B. L. Gulatee

Gerlands Beiträge zur Geophysik, Leipzig, vol. 46, no. ½, 1935, pp. 91-98

The determination of the earth's potential from a knowledge of the value of gravity at all points of the geoid is considered, and the process for reducing the values of "g" measured at the surface of the earth to their equivalent on the geoid is discussed. The process used by Hopfner and his theory of determination of the potential therefrom are criticized. The writer prefers the method proposed by Stokes for determining the potential at points in space external to the geoid from a knowledge of the gravity values on a level surface that includes all the attracting masses. - E. L. J., Science Abstracts vol. 39, no. 459, 1936.

(3191) NIVEAUSPHÄROID UND HAUPTTRAGHEITSELLIPSOID DER ERDE (LEVEL SPHEROID AND THE PRINCIPAL INERTIA ELLIPSOID OF THE EARTH)

By F. Ackerl and F. Hopfner

Gerlands Beiträge zur Geophysik, Leipzig, vol. 46, no. ½, 1935, pp. 1-31

The expressions of Clairaut are generalized for application to the study of gravity values within a mass. The authors then proceeded to the arithmetical calculation of the values of the flattening of the level spheroid, of the principal moments of inertia of the earth, of its mass, and of the potential values of the geoid. - Authors' abstract.

2. MAGNETIC METHODS

(3192) LES ANOMALIES MAGNÉTIGUES AU SOMMET DU RANTOANDRO

(MAGNETIC ANOMALIES AT THE SUMMIT OF RANTOANDRO)

By Charles Poisson and André Savornin

Comptes Rendus de l'Académie des Sciences, Paris, vol. 202, no. 10,
March 9, 1936, pp. 806-809.

The results of measurements made with Schmidt's balance are summarized iefly and the conclusion is drawn that although the magnetic anomalies in ne basaltic summits of Madagascar are very intense they are not spacious and rm a great number of centers. - W. Ayvazoglou.

(3193) SUR LES POSSIBILITÉS DE PROSPECTION MAGNÉTIQUE À MADAGASCAR (ON THE POSSIBILITIES OF MAGNETIC SURVEYS IN MADAGASCAR)

By André Savornin

omptes Rendus de l'Académie des Sciences, Paris, vol. 202, no. 10, March 9,
1936, pp. 858-861

Some results of magnetic studies carried out by the author with Schmidt's rtical balance are given. - W. Ayvazoglou.

(3194) VALEURS DES ÉLÉMENTS MAGNÉTIQUES À LA STATION DU VAL-JOYEUX (SEINE-ET-OISE) AU 1-ER JANVIER 1936

VALUES OF MAGNETIC ELEMENTS AT THE STATION VAL-JOYEUX (SEINE-ET-OISE) FOR JANUARY 1, 1936.

By Louis Eblé

Comptes Rendus de l'Académie des Sciences, Paris, vol. 202, no. 10,
March 9, 1936, p. 861

The values of magnetic elements, given in a table, are calculated from l hourly values recorded during December 1935 and January 1936. The secular riations represent the difference in the values of the elements for January 35. - W. Ayvazoglou.

(3195) ERGEBNISSE ERDMAGNETISCHER UNTERSUCHUNGEN IM RHEINISCHEN SCHIEFERGEBIRGE

RESULTS OF EARTH MAGNETIC INVESTIGATIONS IN THE RHINE SLATE MOUNTAINS

By H. Reich

Zeitschrift für Geophysik, Braunschweig, vol. 11, no. 7/8, 1935, pp.344-357

The author gives a report on the Z-variometer measurements carried out in e Rhine Slate Mountains (Schiefergebirge) in 1932, 1933, and 1934. Schmidt's eld balance was used. The results are shown in the following four maps: 1. rth magnetic-geological sketch of the Eifel (1935); 2. Magnetic Z-isanomalies er a magnetite deposit in Soonwald (1935); 3. Geological-earthmagnetic sketch the surroundings of Vockenhausen (Taunus) (1935); and 4. Geological-earth-gnetic sketch of a mountain SSW of the Kleine Feldberg, Taunus (1935). From e data collected the conclusion was drawn (a) that the discovered anomaly of great extension possibly may be attributed to the large deposit of Plutonic origin hitherto unknown; (b) the local strong effect of a magnetite deposit could be represented; (c) a picture of the magnetic isanomalies of a magnetic slate range could be drawn, and (d) the influence of a young Tertiary basalt with reversed magnetization could be established.

According to the author it was proved again that an empirical-geological interpretation of magnetic anomalies is more valuable for practical work than the introduction of complicated calculations. - W. Ayvazoglou.

(3196) PLANUNG UND VERLAUF DER MAGNETISCHEN REICHSVERMESSUNG

(PLANNING AND PROCEEDING OF MAGNETIC SURVEY OF THE REICH)

By R. Bock

Zeitschrift für Geophysik, Braunschweig, vol. 11, no. 7/8, 1935, pp. 357-361

The author describes briefly the realization, preparation, and execution of the magnetic survey of the Reich during 1934-35. The new distribution of stations is shown in tables and is compared with the previous conditions. - W. Ayvazoglou.

(3197) GEOPHYSICAL PROSPECTING ON THE SOUTH-WEST RAND

Editorial Note

Mining and Industrial Magazine of Southern Africa, Johannesburg,
vol. 21, no. 13, 1936, p. 565.

This is a summary of Doctor Krahmann's lecture delivered by him on January 27 before a joint meeting of the Geological Society of South Africa and the Chemical, Metallurgical, and Mining Society of South Africa on "The geophysical magnetometric investigations on West Witwatersrand Areas between Randfontein and Potchefstroom"

After describing the instruments used, Krahmann explained the susceptibilities and magnetic quality of the Lower Witwatersrand Series of rocks, in special relation to the magnetic shales. He described the new method of interpretation by comparing actual, observed curves, with calculated curves. He dealt with geological deductions obtained from the magnetic surveys in the Eastern and Western Sections of West Witwatersrand Areas, Ltd., and mentioned that 8 completed boreholes and an additional 9 in course of being drilled were sited by means of the investigations. He arrived at the conclusion that the magnetometric method used in close co-operation with geological investigations has demonstrated the practicability of tracing the Main Reef Series under heav cover throughout a large area, which is of great potential value and where oth methods have been unavailing in the past.

Krahmann and his assistants carried out from November 1930 to December 1935 a total of 116,914 observations and 1,429 miles of traverse, beside which extensive topographical, aerial, and geological surveys have been conducted. - W. Ayvazoglou.

(3198) A 42-DAY COMPARISON OF FOUR VERTICAL-INTENSITY VARIOMETERS OF THE KNIFE-EDGE TYPE

By Geo. Hartnell

Terrestrial Magnetism and Atmospheric Electricity, Baltimore,
vol. 41, no. 1, 1936, pp. 65-73.

Four Z-variometers of the knife-edge type were operated simultaneously at e Cheltenham Magnetic Observatory for six weeks in 1935. Their relative per-rmance was determined by comparing the ordinates for four periods of one hour ch day. The results indicate that variometers of this type, carefully de-gned and of superior workmanship, can be operated satisfactorily for observ-ory purposes, if they are kept free from mechanical jars and the supporting rfaces are kept clean. - Author's Abstract.

(3199) GEOMAGNETIC COORDINATES FOR THE ENTIRE EARTH

By A. G. McNish

Terrestrial Magnetism and Atmospheric Electricity, Baltimore
vol. 41, no. 1, 1936, pp. 37-44

During a recent investigation the author found it necessary to construct system of geomagnetic coordinates covering the entire earth. As they may found useful to those engaged in terrestrial-magnetic, cosmic-ray, and other ophysical researches for finding the geomagnetic coordinates of various places e nomographs prepared are reproduced in this article. Instructions for using e nomographs are given. - W. Ayvazoglou.

3. SEISMIC METHODS

(3200) EICHUNG VON FERNSCHALLEMPFÄNGERN (MEMBRANAPPARATE UND UNDOGRAPHEN)

(ADJUSTMENT OF TELE-SOUND RECEIVERS: MEMBRANE-APPARATUS AND UNDOGRAPHS)

By Heinz Dobberstein

eitschrift für Geophysik, Braunschweig, vol. 11, no 7/8, 1935, pp. 362-377

Two methods of adjusting tele-sound receivers of frequencies from 1 to 20 nd to 80 Hertz are described, and the different types of apparatus are com-ared by examining the resonance curves taken by the membrane-apparatus and ndographs.

Chapters of the article: 1. Efficiency of the tele-sound receivers. 2. ethods of adjusting. 3. Results (undographs, membrane-apparatus). 4. Ap-lications. - W. Ayvazoglou.

(3201) NOTES ON THE BLOCK STRUCTURE OF THE EARTH'S CRUST

By Naomi Miyabe

Scientia, Bologna, Vol. 59, no. 285, 1936, pp. 15-19

The analysis of the documents concerning the horizontal and vertical movements of the earth's crust has revealed some remarkable characteristics of the crust's deformation, especially of movements in blocks. The present article conveys an idea of the dimension of these blocks and of their behavior with regard to seismic waves and sets forth the possibilities of certain hypotheses about the physical structure of the earth's crust.- Author's Abstract.

(3202) EARTHQUAKE NOTES

R. R. Bodle, Editor

Eastern Section Seismological Society of America, Washington, D. C., vol. 7, no. 4, 1936, 9 pp.

Contents: 1. Preliminary report on the earthquake of November 1, 1935, by Ernest A. Hodgson. 2. Seismic exploration of Little America, from a lecture by Thomas C. Poulter. 3. Seismological exhibit at St. Louis, by V. C. Stechschulte. 4. Evidence of crustal movement in Oklahoma - an abstract of M. M. Knechtel and H. E. Rothrock's article "Apparent recent crustal movement at western end of the Onachita Mountains, Oklahoma", published in the Bulletin of the American Association of Petroleum Geologists for August, 1935. 5. A series of short editorial notes follows: Examination of the continental shelf off the Atlantic Coast of the United States; Montana strong-motion program; station at College, Alaska, near Fairbanks; Franklin Institute seismograph station; St. Louis meeting of the Seismological Society of America; Benioff vertical seismograph for Tucson; progress noted; deep-focus earthquakes and isostasy; Professor Tsuboi visiting the United States; epicenters; and personalia. - W. Ayvazoglou.

4. ELECTRICAL METHODS

(3203) A NEW EARTH TESTER

By G. F. Tagg

Mining Magazine, London, vol. 54, no. 3, March 1936, pp. 143-145

The earth-resistivity method used in prospecting for mineral ores and similar problems consists essentially in measuring an apparent specific resistance of the earth and, from variations in this value, making deductions as to the nature of the subsoil. It is necessary to have an instrument to measure the value of the resistance. In detecting the presence of bodies or strata at a depth of several hundred feet the value of the resistance is very small, sometimes only a fraction of an ohm. On the other hand the four electrodes used may have resistances amounting to several thousand ohms each and the resistance values given by the instrument must be unaffected by these electrode resistances. The testing current must be alternating.

The Geophysical Megger Earth tester described and illustrated in this pape meets, all the necessary requirements according to the author.

A simplified diagram of connexcons is given in a figure. – W. Ayvazoglou.

(3204) CASES OF POSITIVE VALUES OF THE POTENTIAL OF THE NATURAL ELECTRIC FIELD AND EXAMPLES SHOWING THE NORMALITY OF THEM (IN RUSSIAN)

By P. E. Rodionov

Problems of Soviet Geology, Moscow, vol. 5, no. 3, 1936, pp. 257-268

In the first part of this article the author discusses the theoretical
ditions under which the natural electric fields over sulphide bodies are
oduced. The second part deals with the types of anomalies. According to
e author three types are possible, depending on the spatial position of the
e body and the distribution of its sulphide ores with respect to the level
ground waters:

1. Anomalies of the natural electric field represented by negative val-
s of potential, exclusively.

2. Anomalies in which, in addition to the negative values of potential,
sitive values are observed also.

3. Total absence of natural electric field or only a very weak disturb-
ce of it.

A series of practical cases was examined, from which the following results
re obtained:

1. The existence of positive values without the negative ones was not
served. As a rule positive values had only a limited distribution.

2. Positive values were observed over the zones of ore-bodies extending
wards areas covered with swamps or in which the level of ground waters was
gh.

3. Positive values may appear, also, over the inclined parts of the ore-
dy even if the depth of the level of ground waters remains unchanged.

4. Absolute values of the positive potentials were smaller than those of
e negative potentials. – W. Ayvazoglou.

(3205) EARTH RESISTIVITY AND GEOLOGICAL STRUCTURE

By R. H. Card

ectrical Engineering, New York, vol. 54, no. 11, 1935, pp. 1153-1161

From the summary given by the author we read: "The relation which the
sistivity of the earth's crust bears to the geological structure has been
udied with the aid of many experimentally obtained data. Although the re-
stivity is found to vary between wide limits, and not always to be the same
en for the same type of rock formation in different locations, it has been
und that the variation for any particular material is within more narrow
mits, and that the older materials generally have the higher resistivities.

The results of the studies are of value in several types of electrical calculations."

Items of the article: 1. Previous studies. 2. Usefulness of the data. 3. Summary of principal results. 4. Principles of correlation. 5. Methods of determining earth resistivities. 6. General correlation data. 7. General correlation data for specific areas. 8. Appendix, with a table showing the representative depths determined for 60 cycles. Figures are given showing (1) co relation of effective resistivities with geological periods and materials; (2) correlation of effective resistivities and geological periods - Paleozoic area Figures 3, 4, 5, 6, and 7 show the Areal geology and effective resistivities o pre-Cambrian areas; Appalachian Paleozoic areas; Central and Middlewestern Paleozoic areas; Eastern and Atlantic coastal plain Mesozoic and Cenozoic areas, Gold Coastal plain Mesozoic and Cenozoic areas, respectively. Figure 8 shows layer earth-variation of effective resistivity with thickness of upper layer, sistivities of upper and lower layers, and frequency for wires on the surface the earth. - W. Ayvazoglou.

5. RADIOACTIVE METHODS

(3206) ON THE DIURNAL VARIATION OF THE COSMIC RADIATION

By Victor F. Hess and H. Th. Graziadei

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 41, no. 1, pp. 9-14

A final account is given of a series of observations of the cosmic-ray io ization on the Hafelekar (2,300 meters above sea level) covering three years (1932, 1933, and 1934), with about 20,000 hourly values obtained with Steinke' standard apparatus at constant temperature. The existence of a regular diurna variation of the cosmic-ray ionization according to local time (Middle Europea time) is proved. Its amplitude amounts to ± 0.2 per cent of the total ionizat the maximum occurs at noon, the minimum between 21^h and 3^h M.E.T. A discussio of the possible causes of this variation is given. It must be ascribed to an direct or direct solar influence upon the intensity of the cosmic-ray ionizati Author's Abstract.

(3207) FLUCTUATIONS IN COSMIC-RAY IONIZATION AS GIVEN BY SEVERAL RECORDING METERS LOCATED AT THE SAME STATION

By R. L. Doan

Physical Review, Lancaster, vol. 49, no. 2, 1936, pp. 107-122

The records of the different meters showed a statistical agreement. A ba ometer effect of 1 to 2 percent per Cm. Hg was found. A diurnal variation of tensity was found, the maximum being at 9 A. M. and being 0.9 percent greater the average. With the top shield removed the ionization was greater during ra fall, presumably on account of active deposits brought down by the rain. The tribution in time of bursts was found to be random, and size-frequency distrib could be represented by a single exponential function. The existence of a bar ometer effect in burst frequency could not be proved. The frequency is a func of the shield thickmess. - D. H. F., Sci. Abstr., vol. 39, no. 459, 1936.

(3208) ZUR ANALYSE DER ULTRASTRAHLUNG (ON THE ANALYSIS OF PENETRATING RADIATION)

By B. Gross

Physikalische Zeitschrift, Leipzig, vol. 37, no. 1, 1936, pp. 12-18

The distribution of energy is derived from the absorption curve under the sumption of an expression for the loss of energy of one particle and for the rmation of a secondary radiation. - Author's Abstract, translated by W. Ayvazo-glou.

(3209) NEUE ERGEBNISSE DER EMANATIONSFORSCHUNG IM ERDINNERN NEW RESULTS OF INVESTIGATIONS CONCERNING EMANATION IN THE INTERIOR OF THE EARTH).

By G. Aeckerlein

Physikalische Zeitschrift, Leipzig, vol. 37, no. 5, 1936, pp. 153-154

Surprising facts on physical and structural properties were obtained from e content of radium emanation in 1 ccm of pore-volume in the interior of the rth (ϱ_{EM}), the content of radium in 1 ccm of rock (ϱ_{Ra}), and from the ratio these two values $\sqrt{\frac{\varrho_{EM}}{\varrho_{Ra}}}$.

Possibilities of explaining the results obtained by experiments may be ex-cted as soon as full geological knowledge of the underground is available, ter which the details will be published. - W. Ayvazoglou.

(3210) ZWEI NEUE APPARATE ZUR UNMITTELBARER BESTIMMUNG DES IN WASSER UND IN LUFT ENTHALTENEN RADONS

(TWO NEW APPARATUS FOR DIRECT DETERMINATION OF RADON CONTAINED IN WATER AND IN AIR)

By F. Behounek

Physikalische Zeitschrift, Leipzig, vol. 37, no. 6, 1936

The author describes two apparatus assigned for the direct determination f the concentration of radon in water and in air without making any calcula-ions. The first apparatus assigned for analysing water has two measuring nges - from 0 to 70 and from 0 to 700 Mache-Units. The second apparatus serves r measuring the radioactivity of the air by means of the compensation method. e apparatus is portable and its measuring range is from 0 to 10 Mache-Units. - thor's Abstract, translated by W. Ayvazoglou.

6. GEOTHERMAL METHODS

(3211) ÜBER MESSUNGEN DER ERBODENTEMPERATUR AN SALZDOMEN

G.A. 86

(ON THE MEASUREMENTS OF THE TEMPERATURE OF THE GROUND ABOVE SALT DOMES).

By M. Paul

Zeitschrift für Geophysik, Braunschweig, vol. 11, no. 7/8, 1935, pp. 388-392

The author reports on the measurements of the temperature of the ground above salt domes with the purpose of determining whether the horizontal distribution of temperature of the ground is influenced by the heat conductivity of the subsoil at great depths. About 700 measurements of temperature at 2 m depth were made. It was established that the average temperatures of the grou above salt domes were everywhere higher than the average temperatures of the ground above the adjoining parts of salt domes. The measurements are continue Author's Abstract, translated by W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(3212) DIRECTIONS IN PROSPECTING FOR DEPOSITS OF GREAT MAGNITUDE BY DRILLING ACCORDING TO A COMPLEX GEOPHYSICAL SURVEY CARRIED OUT ON THE REGION IN QUESTION. (IN RUSSIAN)

By V. S. Nikonov

Gornyi Journal, Moscow, no. 3, March 1936, pp. 47-50

The author discusses the necessity of geophysical prospecting of a region in question before drilling is started, especially on areas where deposits of great magnitude are known to exist. He describes the application of combined geophysical methods (gravimetrical, magnetic, and seismic) in two areas of the Kursk magnetic anomaly. Based on these surveys, lithologic maps of Pre-Cambri masses containing ore deposits were drawn. After the elaboration of the geophysical data the most favorable locations of wells to be drilled were determined. - W. Ayvazoglou.

(3213) PROBLEMS OF A COMPLEX PROSPECTING FOR SULPHIDE DEPOSITS (IN RUSSIAN)

By N. I. Sofronov

Materials of the Central Geological and Prospecting Institute, Leningrad, General Series, no. 1, 1936, pp. 66-74.

Methods of geophysical prospecting of sulphide deposits used at the prese time are discussed. The methods, mostly those of electrical prospecting, are found not to give sufficiently good solutions, and the author recommends the utilization also of the physical properties of sulphide ores such as high heat conductivity, low coefficient of absorption of energy of waves of rigid oscill ions, and the ability to resound to certain frequencies of electrical oscillat Methods of utilizing the physical properties should be developed, acording to the author. - W. Ayvazoglou.

(3214) DAS GEOPHYSIKALISCHE OBSERVATORIUM DER UNIVERSITÄT LEIPZIG (GEOPHYSICAL OBSERVATORY OF THE UNIVERSITY OF LEIPZIG)

By P. Mildner

itschrift für Geophysik, Braunschweig, vol. 11, no. 7/8, 1935, pp. 329-339

A brief description of the buildings, equipment, and work of the geophysical servatory is given. The observatory works mainly on seismic, earth's magnetic, d micro-meteorological observations. - W. Ayvazoglou.

(3215) EINIGE UNTERSUCHUNGEN ÜBER DIE STRUKTUR DER RICHTUNGSSCHWANKUNGEN DES WINDES

(SOME INVESTIGATIONS ON THE STRUCTURE IN THE DEVIATIONS OF THE DIRECTION OF WIND)

By G. A. Suckstorff

itschrift für Geophysik, Braunschweig, vol. 11, no. 7/8, 1935, pp. 378-388

The author gives the results of registering the directions of the wind by ans of a new wind-measuring device. The device is described. - W. Ayvazoglou.

(3216) GEOPHYSICAL WINDOWS)

Editorial Note

Coal Age, New York, vol. 41, no. 5, 1936, p. 169

Underground geophysical surveys in coal mines are recommended before ming has been abondoned and approach is made impossible, in order to prevent the eat loss resulting when a coal seam lies undiscovered in the depths of a mine. ophysical surveys in lower or higher beds may enable these forgotten coal areas be discovered. - W. Ayvazoglou.

9. NEW BOOKS

217) Ayvazoglou, W. Patents on geophysical prospecting issued in the United States, England, Canada, Australia, Germany, France, and Russia. Published by the U. S. Department of the Interior, Bureau of Mines, Washington, D. C. Information Circular 6883, April 1936. The circular contains brief summaries of 545 patents arranged according to the methods of prospecting. An index of authors is included.

218) Coast and Geodetic Survey, U. S. Department of Commerce, 510 Custom House, San Francisco, California. Abstracts of earthquake reports for the Pacific Coast and the Western Mountain Region, July 1, 1935, to Sept. 30, 1935. 27 pages. This information has been collected by the San Francisco field station of the U. S. Coast and Geodetic Survey in cooperation with many local organizations and individuals. For further details, or copies, address the Inspector in Charge of the field station, San Francisco, or the Director, U. S. Coast and Geodetic Survey, Washington, D. C.

(3219) Hazard, Daniel L. Results of observations made at the United States Coas and Geodetic Survey Magnetic Observatory at Cheltenham, Md., in 1929 and 1930. U. S. Department of Commerce, Coast and Geodetic Survey, Washingto D. C. Contents: Introduction; Instruments; Constants of Magnetograph; Ab- solute observations and base-line values; Diurnal variation; Summaries of monthly and annual means; Hourly values of declination, 1929; Hourly value of horizontal intensity, 1929; Hourly values of vertical intensity, 1929; Hourly values of declination, 1930; Hourly values of horizontal intensity, 1930; Hourly values of vertical intensity, 1930; Magnetic storms.

(3220) Hecker, O. Möglichkeiten der Erforschung des Erdinnern. (Possibilities for exploring the interior of the earth.) Jena, Gustav Fischer, 1935, 26p 8 figs, price, R. M. 1.40. Investigations of the interior of the earth ar described: (1) by means of studying the velocity of propagation of waves and by measuring the gravity with pendulums for obtaining knowledge on the deepest layers, and (2) by investigating the earth's crust with other geophysical methods.

(3221) Journal of the Society of Petroleum Geophysicists, Houston, Tex., vol. no. 1, July 1935. Contents: 1. Notes on the early history of applied geo physics in the petroleum industry, by E. deGolyer, pp. 1-10. 2. On the strategy and tactics of exploration for petroleum, by E. E. Rosaire, pp. 11-26. 3. Explosives and electric blasting caps for geophysical prospecti by G. H. Loving and G. H. Smith, pp. 27-33. 4. Note on the theory of seis prospecting, by C. H. Dix, pp. 34-43. 5. Discovery of a small producing structure in Okmulgee County, Oklahoma, by reflection seismograph, by G. Westby, pp. 44-59. 6. Portable dynamite storage magazines, by J. W. Flude pp. 60-64.

(3222) Larvaron. La radiotellurie, ses applications pour la recherche des eaux des minerais, l'étude des plantes et des sols. Ses applications dans la biologie et la médecine humaine. (Radiotellurics, its application for dis covering waters and minerals and for studying plants and soils. Its appli cation in biology and human medicine.) Price 20 francs. Available through "Mines, Carrières, Grandes Entreprises," Paris, 10 galerie Vivienne. The first part of the book deals with the theory of this science, the second with investigations on waters in laboratory and in the field, the third wi geological and mining studies, and the fourth with the study of the relati ship of radiotellurics to agriculture, biology, and medicine.

(3223) Maurain, Ch. Magnétisme et électricité terrestres, Fascicule 1. Magnetis and terrestrial electricity. no. 1. Terrestrial magnetism).

Paris, Hermann et Cie, 1935, 62 pp. (Actualités Scientifiques et Industrielles 287, Physique du Globe, I).

(3224) Rodionov, P. F., and Pruschinsky, J. M. Electrometrical work by the method of equipotential lines in the Ural Mountains. (In Russian.) Issue by the Central Geological and Prospecting Institute, Leningrad, U.S.S.R. Transactions no. 54, 1936, 120 pages, 79 figs, price 4 rubles. The autho give a series of practical suggestions concerning organization and perform ance of field work by the method of equipotential lines under the conditio in the Urals and discuss the interpretation of results of the field work.

Contents: Chapter one-Method and organization of the work (Preparatory work, measurements, topographic survey, and elaboration in the field). Chapter 2.-Description of the mapped areas (geological description of pyrite deposits; description of single area according to the regions). Chapter 3.-Conclusions.

25) Schwinner, Dr. Robert. Lehrbuch der physikalischen Geologie. (Handbook of physical geology.) Volume I: The earth as a celestial body. 356 pp., 62 figures, and 1 map. price 16 Reichsmark. March 1936. Published by Gebrüder Borntraeger in Berlin, W 35, Koester-Ufer 17. Contents: Chapter one.-Our relations to the fixed stars system. Chapter 2.- The sun as a fixed star. Chapter 3.- The planet system. Chapter 4.- The development of the sun system; origin of the earth, "cosmogony". Chapter 5.- The meteorites. Chapter 6.- Consistence of the earth. Chapter 7.- The rotation of the earth. Chapter 8.- The development of the system, earth-moon. Volumes 2 and 3 of the book are in preparation. Vol. 2: Statical Geology. Vol. 3: Dynamic Geology.

26) Society of Petroleum Geophysicists. Geophysics, a Journal of General and Applied Geophysics, vol. 1, no. 1, January, 1936, 178 pp. Price $3 to nonmembers of the Society. Editor, F. M. Kannenstine, 2011 Esperson Bldg., Houston, Tex. In a note by the editor we read: "Geophysics is the official publication of the Society and in it are published all of the papers, discussions, and commutations received from the membership which are accepted for publication by the editor. Copies are sent without additional charge to all members of the Society in good standing."

Contents: 1. Black magic in geophysical prospecting, by L. W. Blau. 2. On seismic computations, with applications, I. By M. M. Slotnick; 3. Magnetic Prospecting in Santa Catharina, Brazil, by M. C. Malamphy; 4. The Dip needle as a magnetometer, by C. V. Swanson; 5. A new reflection system with controlled directional sensitivity, by F. Rieber; 6. Fundamental photographic processing operations influencing production of seismograph records, by F. A. Tompkins; 7. The economic utility of thermometric measurements in drill holes in connection with drilling and cementing problems by, E. G. Leonardon; 8. The place of the vertical gradient in gravitational interpretations, by H. M. Evjen; 9. Summary of some pending patent litigation relating to seismic exploration, by G. R. Hrdlicka; 10. Exploration and production in the Gulf Coast through 1935, by E. E. Rosaire and M. E. Stiles; 11. The geophysics of the Tomball oil field, Harris County, Tex., by J. Brian Eby; 12. Regional geophysical activity reports for 1935, by J. H. Wilson, E. McDermott, E. L. Caster, H. G. Patrick, J. B. Eby, J. P. Schumacher, E. E. Rosaire, and K. Ransone.

10. PATENTS

(3227) DETERMINING THE NATURE OF THE SUBSOIL

Arthur Broughton-Edge, London, England

U. S. Patent 2035943 Issued March 31, 1936

This invention relates to a method of determining the nature of the subsoil and detecting or locating minerals, metals, or metalliferous deposits, wherein an alternating current is passed through the area under exploration between two electrodes that are permanently fixed in position during exploration of that area, and, by means of three movable electrodes connected to variable impendance ratio arms, step-by-step readings of potential ratio are taken by placing the movable electrodes at successive points anywhere within the area under exploration, the distances between these points being small compared with the distance between the permanently fixed electrodes, and each reading comprising the instantaneous comparison of phase and potential differences between currents flowing between any two pairs of the three points at which the movable electrodes are placed.

Claims allowed - 1.

(3228) MEASURING EARTH RESISTANCES

James Boyd, Denver, Colo., and Burt E. Moritz Jr., Chicago, Ill.

U. S. Patent 2036193 Issued April 7, 1936

This invention relates to a system comprising a source of alternating current connected in series with a fixed calibrated resistance and a pair of ground electrodes adapted to be inserted at spaced points in a geological formation; a voltmeter having means to indicate the potential drop between two points without drawing any appreciable current, electrode means for connection to the ground across a portion of the formation between the points at which said first-named electrodes are connected to the formation; leads from said calibrated resistance, at least one of which is adjustable along said calibrated resistance whereby to place any desired fraction of said resistance between said leads and switching means for connecting said voltmeter selectively to said second-named electrode means to determine the potential drop across said portion of the formation, and said leads from the calibrated resistance to find the resistance necessary to provide the potential drop across aaid portion of the formation.

Claims allowed - 1.

(3229) METHOD AND APPARATUS FOR LOGGING A WELL

Ludwig W. Blau and Ralph W. Gemmer, Houston, Tex.,

Assignors to Standard Oil Development Co.,
A corporation of Delaware.

U. S. Patent 2037306 Issued April 14, 1936

This invention relates to the method of measuring the impedance of the ground between the terminals of an exploring circuit, which comprises creating electric oscillations of given frequency in an oscillatory circuit separate from the exploring circuit and passing the oscillations by inductance through the exploring circuit, whereby the impedance effects of the current path through the ground appear as mutual inductance effects in the oscillatory circuit.

Claims allowed - 14

(3230) METHOD AND APPARATUS FOR ALTERNATING-CURRENT INVESTIGATION OF UNCASED DRILL HOLES.

John Jay Jakosky, Los Angeles, Calif.

S. Patent 2038046 Issued April 21, 1936

This invention relates to an alternating-current process for determin- g the character and thickness of the geological formations traversed by cased drill-holes, and consists in applying alternating current successiv- y to different elementary portions of the formation adjacent to such a ill-hole and measuring the alternating-current phase angles between current d potential while maintaining the system at approximately the resonant equency of the measuring system, due to the formations encountered at dif- rent depths inside the drill-hole.

Claims allowed - 15

(3231) METHOD AND APPARATUS FOR THE DETERMINATION OF DIRECTION OF A SOURCE OF WAVE ENERGY

Beverly R. Hubbard, Melrose, Mass., Assignor, to
Submarine Signal Co., Boston, Mass., A Corporation
of Maine.

S. Patent 2040850 Issued May 19, 1936

This invention relates to a method of determining the direction of und waves which consists in receiving the incident sound impulses at two roups of spaced points, converting said impulses into corresponding elec- ric impulses, transmitting said impulses over paths of relatively different ime length, combining a portion of the energy of the two groups of impulses n an additive manner and the remainder in a subtractive manner, simultan- usly producing an audible indication of the additively combined energy and visible indication of the subtractively combined energy while varying the ime length of the said paths until the impulses are in phase.

Claims allowed - 7.

(3232) MEASURING GRAVITATIONAL FORCES

Thyssen-Bornemisza, Stephan, Baron von, 126,
Stadhouderslaan, Haag, Holland

ritish Patent 437559 Issued Nov. 13, 1935

This invention relates to a device by which variations in gravitational orce are measured by the consequent displacement of a mass connected to a ever system, the variations in portions of which produce such variations in ne lever arm with which the mass, a restraining spring, or an auxiliary ass, acts that the displacement is amplified.

(3233) PROSPECTING FOR MINERALS, ETC.

Ges. für nautische und tiefbohrtechnische Instrumente,
and Martienssen, O., Werk Ravensberg, Kiel, Germany

British Patent - 437937 Issued Nov. 20, 1935

This invention relates to a method of investigating the geological formations penetrated by depth bores, which may be filled with water; a high-frequency current is generated within the bore and a low-frequency or direct current is conducted above ground, the frequency or intensity of the latter current being modified according to variations in the high-frequency current, which variations are dependent on the electrical or magnetic characteristics of the formation surrounding the part of the bore in which the high-frequency current is generated.

(3234) METHOD OF MEASURING RADIATION

V. I. Veksler, A. V. Ivanov, and A. V. Bibergal

Russian Patent 45678 Issued Jan. 31, 1936

This invention relates to the method, according to that of the Geiger-Miller counter, in which the circuit of the counter is fed by undulatory current and the amount of radiation is determined from the mean value of the current flowing through the arrangement in the circuit.

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UNITED STATES DEPARTMENT OF THE INTERIOR
Harold L. Ickes, Secretary

GEOLOGICAL SURVEY
W. C. Mendenhall, Director

Bulletin 887

GEOPHYSICAL ABSTRACTS 87

JULY–DECEMBER 1936

COMPILED BY
W. AYVAZOGLOU

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GEOPHYSICAL ABSTRACTS 87, JULY-DECEMBER 1936

Compiled by W. Ayvazoglou

PREFATORY NOTE

The geophysical section of the United States Bureau of Mines was transferred to the United States Geological Survey July 1, 1936. Prior to that date mimeographed abstracts of geophysical literature had been published monthly, numbered 1 to 86. The present bulletin contains abstracts for the period July to December 1936 and an index of abstracts for the whole year. Under the present plan the abstracts will be issued hereafter in separate chapters, each chapter covering three months and four chapters forming a complete bulletin for the calendar year. The next number, Geophysical Abstracts 88, will therefore cover January, February, and March, 1937, and will appear as Bulletin 895-A.

1. GRAVITATIONAL METHODS

3235. Abakelia, M. S., On the present state of gravimetrical studies in the Caucasus [in Russian]: Problems of Soviet Geology, vol. 6, no. 4, pp. 360-365, Moscow, 1936.

After a brief historical outline of gravimetrical work in the Caucasus since 1829, the author examines the gravimetrical map compiled by him based on the determination of the relative gravity carried out from 1900 to 1934. Two positive zones corresponding to the mountain massifs of the Great Caucasus and Trans-Caucasus are well expressed. Two negative zones, one between Baku-Makhach Kala-Kisliar, etc., and the other through Kurdamir-Tiflis-Sukhum, are also shown.

The zone of positive anomalies in the region of Kurdamir deserves special attention. The maximum values of the anomalies in the Caucasus, calculated according to Faye's reduction, vary between wide limits from 140 to 240 milligals; the negative anomalies amount to −130 milligals (near Baku).—*W. A.*

3236. Arkhangelsky, A. D., and Fedynsky, V. V., Geological results of gravimetric investigations in Central Asia and southwestern Kazakhstan [in Russian]: Acad. sci. U. R. S. S. Bull., Sér. géol., no. 1, pp. 3-33, 1936.

Observations at 679 points on the determination of the force of gravity in Central Asia and southwestern Kazakhstan are summarized in this article. From these data the authors compiled maps of full anomalies as well as of Bouguer's anomalies of the region under consideration, which are of great interest for the study of the geologic structure of the region connecting Europe with Central Asia. On the basis of the gravity anomalies discussed in the first part of the article the authors in the second part criticise principles of isostasy which fail to explain the peculiar gravimetric phenomena of Central Asia. They propose as another explanation of the anomalies that the areas of low gravity at the surface may overlie matter of low density at depth.—*Authors' abstract, translated by W. A.*

3237. Barton, D. C., Calculation of the cap from torsion-balance data, Hoskins Mound salt dome, Brazoria County, Tex.: Am. Inst. Min. Met. Eng. Tech. Pub. 719, 10 pp., 1936.

The practical results of this survey and of the calculations based on it were that the cap rock was extended 1,000 to 1,500 feet northward and eastward beyond the hitherto surmised portion of its edges, and that the Freeport Sulphur Co. was induced to step out much farther with its exploratory wells than it might have cared to do without these data; and that with a few exploratory wells, it could block out the extent of its sulphur reserves over a large area. The first exploratory well after the completion of the calculations was located 1,000 feet farther north than the company might have cared to locate it otherwise and encountered the cap approximately at the predicted depths. Although the predictions of the depths were not confirmed so closely by subsequent wells on other parts of the dome, all the predictions of depth and quantity of cap have proved well within the accuracy required by the sulphur-mining operations.—*Author's summary.*

3238. Bowie, William, Local densities affect values of gravity: Jour. Geology, vol. 44, no. 4, pp. 510-514, 1936.

Virginia and Maryland, with parts of adjoining States, are included in the present gravimetric study, which shows that the isostatic anomalies are closely related to densities of underlying geological formations in this area. No definite relationship of the anomalies to the topography of the area is found.—*Author's abstract.*

3239. Bullard, E. C., and Jolly, H. P. L., Gravity measurements in Great Britain: Royal Astron. Soc. Monthly Notices, Geophys. Suppl., no. 3, pp. 443–477, April 1936.

A history of gravity observations, with full tables, is given from Kater's in 1817 down to the present day. Gravity anomalies are calculated on Hayford's hypothesis for various depths of compensation. The anomalies increase westward and are partly accounted for by the difference in density between the younger rocks to the southeast and the older to the north and west. To account fully for the anomalies it is necessary to assume that the Paleozoic rocks of the Hebrides are denser than those under the east of England.—*W. A. R., Sci. Abstracts, vol. 39, no. 463, 1936.*

3240. Bullard, E. C., Gravity measurements in East Africa: Royal Soc. London Philos. Trans., ser. A, vol. 235, no. 757, pp. 445–531, 1936.

The paper consists of two parts. Part 1 is entirely concerned with the measurements; part 2 deals with the interpretation of the results.

Measurements of the intensity of gravity at 56 stations in East Africa and at Cape Town are described. The measurements have been made by comparing the periods of pendulums swinging in Africa with those of pendulums swinging in Cambridge, by means of wireless signals.

Ordinary Morse messages were used, and no special transmissions were necessary.

The results of this work and of Professor Kohlschütter's 1899–1900 expedition are discussed. The attraction of the topography of the whole earth and of its compensation at 87 stations in East Africa has been calculated on various hypotheses as to the vertical distribution of the compensation. It is found that the African plateau is closely in isostatic equilibrium with the exception of the Rift Valleys. The Rift Valleys usually show a gravity deficiency. This deficiency can be accounted for if they are the result of compression, but not if they have been formed by tension. The compression theory is discussed in detail.—*Author's summary.*

3241. Gulatee, B. L., Gravity formulas in geology: Indian Acad. Sci. Proc., vol. 3A, pp. 221–235, March 1936.

The more important gravity formulas are discussed from the point of view of the degrees of approximation involved, as well as of the interpretation of the various terms.—*W. A. R., Sci. Abstracts, vol. 39, no. 462, 1936.*

3242. Haalck, H., Der neue statische Schweremesser des Geodätischen Instituts in Potsdam [The new statical gravimeter of the Geodetic Institute in Potsdam]: Zeitschr. Geophysik, vol. 12, no. 1, pp. 1–21, Braunschweig, 1936.

In a series of articles previously published in the Zeitschrift für Geophysik (vol. 7, no. 1/2, 1931; vol. 8, nos. 1 and 5, 1932; vol. 9, no. 1/2, 1933; vol. 11, nos. 1 and 2, 1935) Haalck described the development of the new statical gravimeter. In this article he gives details of the developed instrument manufactured in 1934–35 and used in the summer of 1936. Contents of this article: (*a*) Description of the instrument; (*b*) Examples of measurements; (*c*) Comparison of the results of measurements obtained by statical gravimeter and gravity-pendulum; (*d*) Conclusions regarding the carrying out of surveys.—*W. A.*

3243. Haalck, H., Barometrische Höhenmessung bei statischen Schweremessungen mit Hilfe einer praktischen Form des Luft-Barometers [Barometric altitude measurement with the aid of a practical form of an air barometer during the taking of statical gravity measurements]: Zeitschr. Geophysik, vol. 12, no. 5/6, pp. 249–253, Braunschweig, 1936.

The author describes an air barometer suitable for measuring small differences in air pressure. In making statical gravity measurements the altitudes of the single points of measurement can be measured with this instrument barometrically with sufficient rapidity and an accuracy of ±0.5 meter.—*Author's abstract, translated by W. A.*

3244. Hopfner, F., Die potentialtheoretischen Grundlagen der Lehre von der Isostasie [Potential-theoretical foundations of isostasy]; Zeitschr. Geophysik, vol. 12, no. 1, pp. 24–29, Braunschweig, 1936.

The author makes some remarks in connection with the objectives and conclusions raised recently concerning mass compensation inside of the earth's crust, based on the distribution of undulations according to Ackerl and Hirvonen.—*Author's abstract, translated by W. A.*

3245. Hopfner, F., Stellungnahme zum vorangehenden Artikel; Potentialtheor des Schwerefeldes [Opinion taken with regard to the above article on tl potential theory of the field of gravity]: Zeitschr. Geophysik, vol. 1: no. 2/3, pp. 66–67, Braunschweig, 1936.

Expresses the view that Jung's arguments discussed in the articl above do not approach the essential part of the question. Therefor he recommends a way in which these arguments should be criticised b scientists in order to solve this problem of physical geology.—*W. A.*

3246. Hoskinson, A. J., Gravity survey at Crosbyton, Tex.: Jour. Geolog vol. 43, no. 4, pp. 436–439, 1936.

Because of strong deformations of gravity anomalies in the vicinity Crosbyton, Tex., which changed within shorter distances more rapidl than in any other area so far tested, a survey was undertaken by th Coast and Geodetic Survey in July 1934 to verify the indications ot tained previously by the torsion balance and magnetometer survey The new perfected Brown gravity apparatus was used. A brief descrip tion of the improvements of the apparatus is given. The positions c the stations, the values of the anomalies, and some other principal fact regarding them are given in a table. The locations of the stations ar shown on the sketch of the area.—*W. A.*

3247. Jung, Karl, Bemerkung zur Potentialtheorie des Schwerkraftfeldes [Re mark on the potential theory of the field of gravity]: Zeitschr. Gec physik, vol. 12, no. 2/3, pp. 65–66, Braunschweig, 1936.

The author feels that, in applying gravity values reduced accordin to Prey for determining the figure of the geoid, Laplace's equation o the potential theory cannot be substituted for Poisson's equation.—*Author's abstract, translated by W. A.*

3248. Kazansky, I. A., Attempt of gravimetrical deduction of the deviation o the plumb line [in Russian]: 7th Conference Baltic Geodetic Comm Trans., no. 7, pp. 3–44, Leningrad, 1936.

According to the author, gravimetry has so far not been much applied in determining the figure of the earth, owing on the one hand to insufficient gravimetric data and on the other to undeveloped methods of calculation. If a suitable method for calculating gravimetric data could be developed, much could be learned about the surface of the geoid.

Two main advantages of the gravimetric method for determining the fundamental characteristics of the geoid are especially mentioned—(1) absoluteness (as the figure of the geoid is obtained with regard to a normal spheroid with its center coinciding with the center of the earth) and (2) possibility of solving the problem for any point, thus obtaining the local figure of the geoid. The present article deals with the practical verification of the gravitational method based on the existing reliable data.—*W. A.*

3249. Laboccetta, L., Dimensions of the earth: R. accad. Lincei Atti, vol. 22, pp. 517–522, Dec. 1, 1935.

The radius of the earth, assumed spherical, is obtained as a function of the sidereal day and the period of oscillation of a meter pendulum at the pole and at the Equator. The analysis is based on the author's concept of proper time. For the actual earth pendulum measurements along a meridian would give the variation of radius with latitude.—*W. S. S., Sci. Abstracts, vol. 39, no. 462, 1936.*

3250. Lejay, Pierre, Nouvelles déterminations de l'intensité de la pesanteur en France [New determinations of the intensity of gravity in France]: Acad. sci. Paris Comptes rendus, vol. 203, no. 1, pp. 13–16, July 6, 1936.

Values of the intensity of gravity measured at 57 new stations are given in a table. Measurements were made with pendulums 42 and 510 bis. The values obtained by the two pendulums agreed well with one another, and the means were taken. The accuracy of the measurements was of the order of 2 milligals.—*W. A.*

3251. Meisser, O., Tabelle der Normalschwere von 47° bis 56° Breite für sehr genaue relative Schweremessungen [Normal gravity table for latitudes from 47° to 56° for very accurate relative gravity measurements]: Zeitschr. Geophysik, vol. 12, no. 2/3, pp. 63–64, Braunschweig, 1936.

A table is given showing the values of normal gravities, according to Helmert's formula, for latitudes from 47° to 56°. The table has proved to be very suitable in making reductions of gravity values which require a great relative accuracy equal to about $\frac{1}{10}$ milligal.—*W. A.*

3252. Mercier, André, Effet d'une erreur d'estimation des densités du sial et du sima dans l'évaluation des anomalies de la pesanteur [Effect of density errors of sial and sima in evaluation of gravity anomalies]: Archives sci. phys. et nat., vol. 18, pp. 21–23, January–February 1936.

The author regards the continents as blocks of sial in hydrostatic equilibrum in sima. Any error in the assumed densities will affect the mean level of contact of sial and sima and the calculated gravity anomaly. It is shown that the difference of the two densities is of prime importance for the value of the anomaly, while the possible range of error is affected rather by the assumed density of the sial. The necessary formulas are given.—*T. L. M., Sci. Abstracts, vol. 39, no. 461, 1936.*

3253. Mikhailov, A., Über die Anwendung der Formel von Stokes und die dabei zu gebrauchende Reduktion der Schwerkraft [On the application of Stokes' formula and the consequent reduction of gravity to be used]: 8te Tagung der Baltischen geodetischen Kommission in Tallin und Tartu in 1935 Verh., pp. 207–231, Helsingfors, 1936.

A translation of K. Jung's abstract, published in Geophys. Berichte (Zeitschr. Geophysik, vol. 12, no. 4, 1936), page 97, reads as follows: "Some arrangements of masses are given in which the gravity anomaly and the surfaces can be calculated. From the examples given it is proved that Stokes' formula shows with sufficient accuracy the relation between the gravity anomaly and the level surface and that it is inadmissible to insert in the Stokes formula the gravity values reduced according to Prey."—*W. A.*

3254. Miller, A. H., and Norman, G. W. H., Gravimetric survey of the Malagash salt deposit, Nova Scotia: Am. Inst. Min. Met. Eng. Tech. Pub. 737, 11 pp., 1936.

Definite gravitational effects, including a distinct and characteristic lowering in gravity, were observed in the area over the deposit. In the square mile that was surveyed one other region of low gravity was discovered. The question as to whether or not it also contains a buried deposit of salt, in commercial quantities, remains unsettled. A traverse with magnetometers across the deposit showed only small anomalies, and these were not confined entirely to the section over the deposit.—*Mining and Metallurgy, vol. 18, no. 357, 1936.*

3255. Milne, E. A., Inverse-square law of gravitation: Royal Soc. London Proc., vol. 156 A, pp. 62–85, 1936.

The problem of "local" gravitation is investigated by kinematic methods. By forming a condensation in the substratum or smoothed-out universe it is shown that the acceleration of a free particle may be dissected into two components, one due to the substratum alone and the other associated with the departure of the system from homogeneity. It is shown that the latter component, for a particle in the vicinity of a condensation, is inversely proportional to the square of its distance from the nucleus of the condensation, with a constant of proportionality identical with that which emerged in a previous study of accelerations due to the substratum alone. No appeal is made, in the deduction, to any specific theory of gravitation, or to the supposed existence of any universal constant of gravitation. The inference is that the phenomenon of gravitation does not depend on the micro- or macro-structural properties of matter but is an inevitable element in the motions which particles undergo in one another's presence if they are to be consistently observed by observers in a universe satisfying Mach's principle. Miscellaneous consequences are briefly considered.—*Author's abstract.*

3256. Nikiforov, P. M., The problem of isostasy [in Russian]: 7th Conference Baltic Geodetic Comm. Trans., no. 7, pp. 53–60, Leningrad, 1936.

A critical discussion in which Nikiforov attacks some of the present hypotheses of isostasy (Pratt, Airy, Dutton, Hayford, Bowie, etc.). The author's remarks are summarized as follows:

1. Any connection between the external gravitational field of the earth and the distribution of masses inside the crust cannot be established by geodetic data alone.

2. In about one-half of the area, for which data on gravity at the surface of the earth are available, considerable deviations are found from the postulates basic to present theories of isostasy.

3. If the principle of isostasy is taken as foundation, gravity anomalies lead to incorrect conclusions about vertical epeirogenetic movements in many localities.

4. Attempts to explain the isostatic raising and sinking of the earth's crust by applying the process of metamorphic transformations of minerals ignore thermodynamic principles.

5. The existence of earthquakes with depths of focus equal to about 400 kilometers contradicts the idea of a sima layer of tenacious liquid with hydrostatic distribution of pressures.

The author concludes that the principle of isostasy cannot be accepted as a geophysical conception—that is, as a theory of the internal structure and physical conditions of the earth's crust.—*W. A.*

3257. Ochapowski, B. L., Schweremessungen mittels Pendeln, ausgeführt auf dem Pamir und in Karelien in den Jahren 1932 und 1933; Mushketov, D., Geologische Erwägungen zu den neuen Schweremessungen auf dem Pamir und in Karelien [Gravity measurement by pendulums carried out on the Pamir and in Karelia in 1932 and 1933; Geologic considerations in connection with the new gravity measurements in the Pamir and in Karelia]: Beitr. angew. Physik, vol. 5, no. 4, pp. 451–479, Leipzig, 1936.

The authors give a detailed description of the gravimetric observations made by Ochapowski with the Lenox-Cunningham pendulum apparatus of the Cambridge Instrumental Co. in the region of Pamir, in Ferghana, and in Karelia. The map of Ferghana-Pamir gives isanomalies of gravity with air reduction according to Fay, and one map of Karelia gives the same information; another map of Karelia shows the corrections by Bouguer.

Some previous values, especially the very large anomalies observed by Zalesski in Central Asia, are proved to be erronous; the reasons for the errors are discussed. A precise determination of the height of the pendulum station above sea level is essential. The parallelism of the topographic relief and of $g_0 - \delta$ is shown in a figure.

The principal conclusions drawn by Mushketov are:

For Asia: 1. From the geologic data the conclusion is drawn that the Pamir-Alay mountain system has a large recent epeirogenetic rising; this is confirmed by the region of negative anomalies (to -200 milligals), which extends from India to Kazakhstan.

2. The depression of Ferghana is a part of this negative region which is not isostatically compensated.

3. The East Pamir and Serindia have positive anomalies; therefore they are in a state of recent sinking.

4. All anomalies have a regional significance and do not correspond to the geologic surface map or to the Alpine or Hercynian tectonics.

For Karelia: 1. The anomalies have also a regional character.

2. The border between the negative and positive values corresponds to the null line bordering the large epeirogenetic rise of Fennoscandia.

For Pamir and Karelia: The distribution of the seismic epicenters agrees approximately with the rising tectonic zones.—*Author's abstract.*

3258. Passarge, H., Flattening and mass of the earth: Gerlands Beitr. Geophysik, vol. 48, no. 1, pp. 81–83, Leipzig, 1936.

The fundamental idea is that the mass of the earth rotating and traveling around the sun is greater than that of a similar fictitious earth that only rotates but is otherwise fixed in space; if gravity of the former is g, that of the latter is $G = g(86144/86400)^2$, while $g - G$ would be gravity on a second fictitious earth which traveled round the sun without rotating. Hence, regarding the acceleration of gravity as a state of motion rather than as due to attraction of masses, it is deduced that the apparent rotation of the earth only affects the lithosphere, the original rotation and that which affects the core being in the opposite direction; the axes of the two rotations are slightly inclined to each other, and the flattening only affects the lithosphere, the amount of which is deduced as $(1 - g_0/g_{90})$ $(1 - L^3\delta\sqrt[3]{\Delta/\delta/M}$, where M is the mass of the earth, L the reduced pendulum length for sidereal time, and Δ, δ the mean densities of the earth and lithosphere respectively. Friction between the oppositely rotating core and lithosphere accounts for terrestrial electricity and magnetism.—*C. A. S., Sci. Abstracts, vol. 39, no. 465, 1936.*

3259. Patzke, Werner, Untersuchungen über die Genauigkeit von Pendelmessungen an fester Station [Investigations on the accuracy of pendulum measurements at a fixed station]: Zeitschr. Geophysik, vol. 12, no. 5/6, pp. 253–268, Braunschweig, 1936.

In the first part of this article the author determines the accuracy of pendulum measurements attained at the Göttingen base station in 1935. The accuracy of the time data for the period of measurements, from September to December 1935, obtained with the time-measuring devices used could be attained at 4×10^{-7} in 93 percent of all the measurements; the error in gravity measurement corresponding to this figure is equal to 0.8 milligal. This error could not be reduced by increasing the accuracy of observation.

Part 2 gives the experimental investigations by which the causes of the pendulum jumps are explained. Changes of the magnetic moments of the invar-pendulum cannot be accepted as an explanation of pendulum jumps. The irregular pendulum jumps are rather caused, as it seems, by the changes in the contacts with the knife edges. When dry friction was eliminated by oiling the pendulum tables the variations in the period of oscillation were reduced (increase of the internal accuracy of pendulums).—*Author's abstract, translated by W. A.*

3260. Die Verwendung von "Askania" Feld- und Drehwaagen [Application of "Ascania" field balances and torsion balances] [editorial note]: Petroleum, vol. 32, no. 39, pp. 9–12, Berlin, 1936.

The fundamental principles and the development of Eötvös' torsion balances and of Schmidt's magnetic field balances are briefly described. Schematic designs and photographic pictures of the balances are added.—*W. A.*

3261. Schleusener, A., Die Leistungsfähigkeit des Thyssen-Gravimeters bei Messungen an Salzdomen, Antiklinalen, u. s. w. [Productivity of Thyssen gravimeter in surveying salt domes, anticlines, etc.]: Öl und Kohle, vol. 12, no. 18, pp. 381–384, 1936.

The high accuracy and reliability of the Thyssen gravimeter has been discussed in previous papers. The mean error in making regional measurements was established to be about ±0.25 to ±0.3 milligal. In making detailed surveys the accuracy attained was even ±0.2 milligal or less. The increased accuracy made it possible to use this instrument for field work and, owing to its simple operation, to increase the number of stations measured in one day. In measurements made around the Benthe salt dome, near Hannover, where 26 stations were measured twice during 2 days, working 8 hours a day, the mean error was less than ±0. 02 milligal. The isogams drawn from these 26 points are shown in a figure. To obtain better results more stations (probably from 100 to 200) are required. Four profiles across the salt dome are shown in figures. Three of them disclose the abrupt change above the edge of the salt dome. One of the profiles does not cross the salt dome but still shows a small decrease in gravity.

Regional measurements have been made in Hannover, Braunschweig, and Schleswig-Holstein.—*W. A.*

3262. Schleusener, A., Über die Reproduzierbarkeit von Messungen mit Thyssengravimetern [On the possibility of reproducing the measurements made with the Thyssen gravimeters]: Beitr. angew. Physik, vol. 6, no. 1, pp. 1–6, Leipzig, 1936.

In a previous article (Das Thyssengravimeter; see Geophys. Abstracts 83) Schleusener has shown that apparently accurate measurements made with pendulums may be incorrect to the extent of many milligals. Consequently all measurements made with the Thyssen gravimeter were repeated at least once. From 80 measurements, for example, of which 68 were repeated once, the difference in the mean value amounted only to ±0.25 milligal and less. The remaining 22 points were repeated twice, and in these the mean error (M. E.) amounted to ±0.22 milligal. The mean error of the measurements on 68 points repeated once was equal to ±0.15 milligal. With 400 set-ups of the apparatus 200 gravity differences were measured at 90 points, and only one measurement was rejected. The largest deviations more than 0.5 milligal amounted to 0.7, 0.64, 0.60, 0.55, 0.54, 0.52 milligal. The average distance between the stations was 1 kilometer. The figures show that measurements made with the same apparatus produce the same results. It is further shown that the same results were obtained by different apparatus used at the same points. To prove this the gravity differences at six points were measured against a base point three times with apparatuses nos. 8 and 11. The results are given in a table. The mean errors obtained were ±0.2 and ±0.25 respectively.

The accuracy of the measurements made by the gravimeter was increased within 1 year from about M. E. = ±1 milligal to M. E. = ±0.25 milligal, and it is probable that in the near future it will be possible to make measurements with a mean error equal to only ±0.1 milligal.—*Author's abstract.*

3263. von Thyssen, Stephan, Über die Überbrückung von grosseren Entfernungen durch das Thyssengravimeter [On the spanning of greater distances by the Thyssen gravimeter]: Beitr. angew. Physik, vol. 6, no. 1, pp. 7–13, Leipzig, 1936.

More than 800 gravimetric points were measured to December 1935 in connection with the geophysical survey of the Reich; among them were 35 stations of the first order. Measurements with distances between stations over 50 kilometers were made with the average error of the single measurements not exceeding ±0.6 milligal. Hannover was connected with Potsdam by measurements made through Gifthorn-Magdeburg over distances of several hundred kilometers. The average error of the results was less than ±0.5 milligal for distances between the stations of about 100 kilometers. The relation of the distances between the stations to the mean error of the gravimeter measurements is shown, based on the material collected from more than 1,000 independent stations.—*Author's abstract, translated by W. A.*

3264. Tsuboi, Chuji, and Fuchida, Takata, Supplementary notes on the most suitable formula for the Japanese gravity values: Tokyo Imp. Univ., Earthquake Research Inst., Bull. 3, pp. 555–557, September 1936.

In a former paper (Earthquake Research Inst. Bull., vol. 11, no. 4, 1934; Geophys. Abstracts 59) Tsuboi derived by approximate calculation the most suitable formula for the Japanese gravity values. In this paper the authors give the following new formula, based on Helmert's method of condensation reduction:

$$\gamma = 977.998\ (1 + 0.005538 \sin^2 \varphi)$$

The probable errors of the constants in the formula are ±0.019 and ±0.000053 respectively. The ellipticity of the geoid that corresponds to this gravity formula is 1:319.5±5.4.

The fact still remains that the ellipticity of the actual geoid in Japan is considerably smaller than that of the normal one determined from the world-wide gravity determination.—*W. A.*

2. MAGNETIC METHODS

3265. Babienko, D. V., Magnetic anomalies of South Ukraine as a basis of the problem of the great Krivoy Rog [in Ukrainian]: Wiss.-tech. Mitt., no. 3, pp. 8–25, 1935.

Eleven anomalous zones extending meridionally are considered.—*W. A.*

3266. Bahnemann, Fritz, Eine Erweiterung des Einzelpol-Verfahrens [An extension of the single-pole method]: Beitr. angew. Physik, vol. 6, no. 1, pp. 14–24, Leipzig, 1936.

The so-called single-pole method as advanced by Nippoldt for the interpretation of magnetic anomalies is extended to the case of a line. This helps to solve some geologic problems (dikes, etc.) which are difficult to treat by the single-pole scheme. The application of the line method to a practical case is just as easy as that of the single-pole method. An example of abnormal magnetization is treated accordingly.—*Author's abstract.*

3267. Bartels, J., The eccentric dipole approximating the earth's magnetic field: Terrestrial Magnetism and Atmospheric Electricity, vol. 41, no. 3, pp. 225–250, Baltimore, September 1936.

The magnetic dipole, situated at the earth's geometric center O, and whose magnetic field furnishes the best approximation to the observed field of the earth for the year 1922, has an axis alined along the direction from a point A (near the geographic south pole) to the antipodal point B on the earth's surface, with B situated in latitude 78.5° north and longitude 291.2° east. The strength of the dipole is 8.1×10^{25} Gauss cm^3, yielding a maximal horizontal intensity of 0.315 Gauss at the earth's surface.

If the observed field is to be approximated by that of a magnetic dipole not necessarily situated at the earth's center, the best approximation (in a sense to be defined) is furnished by a dipole of the same strength as before and with an axis parallel to AB, the dipole being situated at a point C (magnetic center) 342 kilometers distant from the earth's center O and in a direction toward a point C' in latitude 6.5° north and longitude 161.8° east. The field of this eccentric dipole is computed by formulas similar to those given by Adolf Schmidt, expressed in tables and charts, and discussed.

The approximation of the observed earth's magnetic field furnished by the eccentric dipole is compared with that furnished by the geometrically centered dipole (uniform magnetization) by discussing the differences, or regional anomalies. The improvement in the approximation due to the shift of the dipole from the geometric center O to the magnetic center C is hardly noticeable for the field in the Northern Hemisphere, but quite distinct in the Southern Hemisphere.—*Author's abstract.*

3268. Bronstein, K. G., and Babienko, D. V., Magnetic anomalies in the central and southern parts of European U. S. S. R. [in Russian]: Soc. naturalistes Moscou Bul., new ser., vol. 43, Sec. geology, no. 13, pp. 264–270, 1935.

A brief description of magnetic anomalies in the Ukraine and in the central part of the European U. S. S. R. is given. The tendency of these anomalies to extend to the north and south is mentioned. The paper contains a map of magnetic anomalies of the Kursk and the Ukrainian magnetic anomalies.—*W. A.*

3269. Davis, C. W., Geological significance of magnetic properties of minerals: Econ. Geology, vol. 30, no. 6, pp. 655–662, 1936.

1. Lodestones are of variable composition, and the manner and degree of their magnetization is accidental; hence their actual magnetic properties show little relation to their present state of magnetization ("residual remanence").

2. Many natural and artificial magnetites, if their coercive forces and remanences are sufficiently great, will, after magnetization, simulate lodestones.

3. Ferric oxides formed by regulated dehydration of gamma ferric-oxide hydrate, exemplified by lepidocrocite, are strongly ferromagnetic and have high coercive force and remanence, while alpha ferric-oxide hydrate, of which goethite is representative, forms ordinary ferric oxide on dehydration.

4. The diagnostic possibilities of magnetites for ore genesis are discussed, evidence being given to show that new methods and apparatus for the determination of magnetic properties of mineral powders and a new interpretation of the nature of the magnetism of minerals should provide an impetus to investigations seeking to establish a relationship between the magnetic properties of minerals and the geological occurrence of their ores.—*Author's summary.*

3270. Fanselau, G., Über den Einfluss der mitschwingenden Luft bei den magnetischen Schwingungsbeobachtungen [On the influence of the co-oscillating air during the magnetic observations of oscillation]: Zeitschr. Geophysik, vol. 12, no. 2/3, pp. 58–63, Braunschweig, 1936.

Measurements made at the magnetic observatory in Potsdam had shown that the influence of co-oscillating air cannot be neglected during the magnetic oscillations. Errors calculated in this article as examples are much greater than the attainable accuracy of measurement.—*Author's abstract, translated by W. A.*

3271. Fanselau, G., Über Messungen mit dem Quarzfaden-horizontal-intensitätsmagnetometer von La Cour in Potsdam, Seddin und Niemeck [On the measurements with the La Cour quartz-fiber horizontal-intensity magnetometer in Potsdam, Seddin, and Niemeck]: Zeitschr. Geophysik, vol. 12, no. 4, pp. 192–197, Braunschweig, 1936.

Relative measurements of the horizontal intensity of the earth magnetic field made with the new quartz horizontal-force magnetometer nos. 3, 5, and 7, constructed by La Cour are summarized in two tables. The instrument is considered very practical and reliable. The average period of one measurement was 25 minutes and the accuracy $\pm 1\gamma$. The method of taking measurements is considerably simpler.—*W. A.*

3272. Fisher, James, and Service, J. H., Maximum sensitivity setting of the dip needle: Terrestrial Magnetism and Atmospheric Electricity, vol. 41, no. 2, pp. 137–142, Baltimore, June 1936.

Neglecting pivot friction and air resistance, the authors set up the equilibrium equation of moments for the common Gurley dip needle. By differentiation of this equation, expressions are obtained that give the best setting of the needle in any given area. In order to apply these expressions in a given area, it is necessary to know the normal inclination in the area and the approximate ratio of probable percentage increase in intensity to probable degrees increase in inclination. Graphs are given showing (1) variation of sensitivity with setting for various values of the above ratio and (2) variation of best setting with changes in the value of this ratio.—*Authors' abstract.*

3273. Fleming, J. A., Intercomparisons of magnetic standards and control of standards, 5 pp., Internat. Assoc. Terrestrial Magnetism and Electricity, Edinburgh assembly, September 1936.

The necessity of accurate determinations of possible systematic errors and corrections for the standard instruments at different observatories is emphasized. Experience has indicated that contact of observers is helpful in ironing out difficulties and differences of procedure and is at the same time of mutual stimulating value in the interchange of ideas. Significant differences of the three magnetic elements found at individual observing piers are described.

A copy of the standard instructions for intercomparisons of magnetic instruments is added to this article. These instructions, entitled "Procedure of Department of Terrestrial Magnetism, Carnegie Institution of Washington, for intercomparisons of magnetic instruments and standards at observatory or field stations", contain the following items: (1) Preliminary, (2) stations, (3) exchange of stations and simultaneity of observations, (4) observations, (5) miscellaneous remarks.—*W. A.*

3274. Forberger, Karl, Magnetische Bodenforschungen im Ausseralpinen Wiener Becken und am Alpenrand bei Wien [Magnetic prospecting in the outer Alpine Vienna Basin and on the border of the Alps near Vienna]: Bohrtech. Zeitung, vol. 54, no. 4, pp. 75–78, Wien, 1936.

This is a detailed summary of Forberger's work issued by the Oesterreichische Petroleum Institut, as Publication 4, 1935, available from the Kommission des Verlages für Fachliteratur Gesell. m. b. H., Vienna, price 6 schillings. (See also Geophys. Abstracts 84, p. 1786.) Maps are added showing (1) magnetic disturbance-profiles through the region of the survey south of the Danube; (2) sketch of the geological conditions of the region surveyed; (3) magnetic disturbance-profiles of the region of the survey north of the Danube; (4) course of isanomalies of two profiles of the outer Alpine Vienna Basin.—*W. A.*

3275. Haalck, H., Über eine neue physikalische Erklärung der Ursache des Erd- und Sonnenmagnetismus und des luftelektrischen Vertikalstromes [On a new physical explanation of the cause of earth's and sun's magnetism and of the air-electrical vertical current]; Zeitschr. Geophysik., vol. 12, no. 2/3, Braunschweig, 1936.

Considering the electrostatic forces existing between the ions and the free electrons in an ionized solid mass, the author shows that in a mass exposed to a very high pressure a certain division of the charge must occur if this mass contains a pressure gradient; an excess of positive charge is observed in the parts of higher pressure and a negative charge in the zones of lower pressure. The rotation of such a mass produces a magnetic field, which corresponds qualitatively and quantitatively to the magnetic field measured on this mass (by applying to the earth and the sun the mathematical relations resulting from the theory). It is then shown that the cause of the air-electrical vertical current can also be satisfactorily explained by the developed theory.—*Author's abstract, translated by W. A.*

3276. Jenny, W. P., Micromagnetic surveys: Oil Weekly, vol. 81, no. 7, pp. 23–32, 1936.

Recent improvements of the magnetic method are discussed as follows:

1. The magnetometer has been greatly improved.

2. The field technique has been improved to such a point that it is now possible to measure the magnetic field with an accuracy of plus or minus 2 gammas as compared with the average accuracy in former years ranging from plus or minus 10 gammas to plus or minus 25 gammas.

3. The basic assumptions for the interpretation of magnetic anomalies have been changed completely. In former years it was thought that all magnetic anomalies were caused by the basement or shallow igneous rocks. Today it is known that there exists sufficient difference in the magnetic susceptibility within the sedimentary columns to produce noticeable magnetic anomalies above structures of commercial interest.

The author shows the results of a number of successful magnetic surveys carried out in recent years in the Gulf coast region, as follows:

Figure 1. Semiregional magnetic picture of Buckeye field, Matagorda County, Tex.

Figure 2. Magnetic profile for Fannett dome, Jefferson County, Tex. (data from magnetic isogam map published by E. G. Nicar)

Figure 3. Magnetic map of Kittrell area, Houston County, Tex.

Figure 4. A north-south micromagnetic profile across a torsion-balance prospect in the Gulf coast.

Figure 5. Micromagnetic isogams on another torsion-balance prospect in the Gulf coast.

Figure 6. Two micromagnetic profiles across the northern extension of the Anahuac field, Chambers County, Tex.

Figure 7. The results of a preliminary survey of the western portion of the Amelia structure, Jefferson County, Tex.

Figure 8. Comparison of a magnetic profile with the top of the hockleyensis zone on a north-south cross section through the New Waverly area, Walker County, Tex.

The facts presented offer conclusive proof that Gulf coast structural features can be outlined and quantitatively interpreted by the micromagnetic method.—*W. A.*

3277. Joyce, J. W., A manual of geophysical prospecting with the magnetometer: U. S. Bur. Mines MS. Rept. 2, 87 pp., 1936.

This manual on magnetic prospecting with the Schmidt magnetometer is presented with the following objects:

1. To familiarize the reader with the fundamental principles that underlie the operation of the Schmidt magnetometer.

2. To describe the physical features of the Schmidt magnetometer.

3. To discuss various factors that influence observations.

4. To indicate corrections to be applied to field data.

5. To enumerate the precautions to be observed in the handling and use of the instrument.

6. To describe field procedure in operating the instrument.

7. To cover possible sources of difficulty in operation and their remedy.

8. To indicate methods of determining instrument constants.

9. To describe various methods of presenting magnetometer results.

10. To outline certain fundamental ideas that underlie the interpretation of magnetic data.

The author concludes: "Emphasis again is placed on the fact that while in general certain fundamental rules governing the technique of interpretation may be formulated, they are of value only so far as their limitations are recognized and their discreet use is supplemented by ample experience and due recognition of all of the known geological and physical factors involved. Finally, all solutions and predictions based on geophysical data must of necessity be possible and plausible geologically."

The manual contains 63 illustrations.—*W. A.*

3278. Keys, D. A., A magnetic survey of the Ivry ilmenite deposit: Am. Inst. Min. Met. Eng. Contr. 102, 7 pp., 1936.

Results of a survey using a vertical magnetic variometer over a deposit of ilmenite in Terrebonne County, Quebec, are given. Photomicrographs of thin sections of the ilmenite and of the country rock, anorthosite, show that the ore is entirely free from magnetite. Magnetic anomalies were taken along north-south and east-west traverses and sometimes amounted to over 7,000 gammas. On the surface of exposed ore in the main pit from which ore had been mined the vertical anomaly was about 2,250 gammas. The position of the ore was deduced by plotting the anomalies along the respective traverses. Indications were that the ore occurs in pods rather than in veins. Maps of the area surveyed and of the anomalies found are given.

An estimate of the approximate depth of the ore in the pit was made from the measured anomaly on the surface and at a point 14.4 feet above the surface. The value of 93 feet thus deduced is not inconsistent with the geological observations.

3279. Krahmann, R., Magnetometrische Untersuchungen am Witwatersrand [Magnetometric investigations on the Witwatersrand]: Glückauf, vol. 72, no. 23, p. 569, Essen, 1936.

This is a summary by H. Reich of a lecture delivered by Krahmann at the meeting of the German Geological Society, held on May 6, 1936. Krahmann reported on the important results obtained by him from the magnetic surveys in the Witwatersrand gold region. A great number of maps and tables were presented. Nine zones of magnetic deposits (magnetite-slate) were established, and the distance of these magnetic zones from the main reef determined. The region to the west of the Rand was investigated by tracing systematic profiles. The correctness of the interpretations made by geophysical and geologic studies was proved by boring.—*W. A.*

3280. Krahmann, Rudolf, The geophysical magnetometric investigations in west Witwatersrand areas between Randfontein and Potchefstroom, Transvaal: Chem., Met., and Min. Soc. South Africa Jour., vol. 36, no. 9, pp. 247–279, Johannesburg, 1936; Geol. Soc. South Africa Trans., vol. 39, pp. 1–44, 1936.

This paper deals with the magnetometric prospecting carried out on the southwesterly extension of the Witwatersrand gold fields. The author attempts to prove the extension of these gold fields to the southwest.

Preliminary experiments were carried out on two traverse lines. On these two profiles practically all strata of the Lower Witwatersrand system outcrop in normal succession, so that the five major magnetic anomalies of the vertical component of the earth's magnetic field recognized there could be directly lined up to the beds causing them.

The experiments demonstrated that the magnetic mapping of many of the formations of this system is a practical possibility even in areas where the formations lie under deep cover.

The principal magnetic anomalies in the Lower Witwatersrand system were determined and are described in a table.

Ad. Schmidt's magnetic field balances (nos. 98583 and 116996) built by the Askania Werke in 1930 and 1932 were used.

Several theoretic curves based on geologic and geophysical work are shown in figures. By constructing curves for every magnetic bed of the Lower Witwatersrand system the author tried to establish from the variation of the vertical magnetic intensity on the surface, as recorded by the magnetic field balance, the true position of the bodies and, if possible, their dip.

Methods of calculation and interpretation are discussed. Eight completed boreholes and nine boreholes now being drilled were located by means of magnetometric investigations, and the results obtained in the completed holes are described. In view of these results the author states that the magnetometric method used in close cooperation with geologic investigations has demonstrated the practicability of tracing the main reef series.—*W. A.*

3281. Krahmann, Rudolf, The geophysical magnetometric investigations on west Witwatersrand areas between Randfontein and Potchefstroom, Transvaal: Chem., Met., and Min. Soc. South Africa Jour., vol. 36, no. 10, pp. 303–310, Johannesburg, 1936.

This is a discussion of Krahmann's paper of the same title published in volume 36, no. 9, pages 247–279, 1936. (See abstract 3280.)—*W. A.*

3282. Logachev, A. A., Experimental magnetic survey from an airplane [in Russian]: Razvedka Nedr, no. 17, pp. 40–41, Moscow, 1936.

Gives a brief description of the apparatus developed by the author, which consists of an induction coil with a bi-plate collector and brushes on a rotary bridge and is assigned for measuring the relative value of the vertical component of the terrestrial field.

The results of the survey conducted over a known magnetic anomaly from an altitude of about 300 meters along the Novgorod-Valday line are represented in two profiles (both ways). The two profiles are compared with that carried out on the ground with Schmidt's balance. The anomaly was determined very distinctly on all three profiles.

The author concludes that the measurement from an airplane of magnetic anomalies having an intensity over 1,000γ is possible with the apparatus developed by him.—*W. A.*

3283. MacCarthy, G. R., Magnetic anomalies and geologic structures of the Carolina Coastal Plain: Jour. Geology, vol. 44, no. 3, pp. 396–406, April–May 1936.

Reconnaissance magnetometer work has shown that several striking anomalies exist in the Carolina Coastal Plain and that many of these anomalies may be correlated with the structural features of the basement rocks. Northeast-southwest structural trends have been observed, further evidence in favor of a northwest-southeast upwarp in the neighborhood of Wilmington has been obtained, and a concealed Triassic basin has been partly outlined.—*Author's abstract.*

3284. McNish, A. G., A new type of vertical-intensity induction variometer: Terrestrial Magnetism and Atmospheric Electricity, vol. 41, no. 2, pp. 101–172, Baltimore, June 1936.

A new type of vertical-intensity induction variometer is described. Extensive tests reveal that it is free from the faults inherent in the older style balance-type instruments. The theory of its operation and other possible applications are discussed.—*Author's abstract.*

3285. McNish, A. G., The new C. I. W. vertical-intensity induction variometer, 3 pp., Internat. Assoc. Terrestrial Magnetism and Electricity, Edinburgh assembly, September 1936.

Rapid advances accomplished in the development of ferromagnetic alloys have permitted the design and operation of a new type of variometer for measuring changes in the vertical component of the earth's magnetic field. This new variometer, developed by the Carnegie Institution of Washington, Department of Terrestrial Magnetism, diverts the vertical intensity into a horizontal direction so that measurements may be made by means of a magnet system suspended by a vertical quartz fiber. Effect of variations in the normally horizontal component of the earth's field is completely eliminated by the design, and hysteresis effects are negligible, owing to the characteristics of the ferro-magnetic alloy used. Operation of the new instrument for nearly a year has proved its eminent superiority over the common types of vertical intensity balances.—*Author's abstract.*

3286. Miliaev, N. A., and Boldyrev, N. P., Magnetic survey of the Chukchee Peninsula [in Russian]: Arctic Inst. Trans., vol. 39, Geophysics, pp. 114–123, Leningrad, 1936.

The authors describe the magnetic survey carried out by them during 1933–34 on the Chukchee Peninsula, near the village of Uelen. An area of about 400 square kilometers was surveyed. Data were collected from 139 stations. The results of the survey are shown in a table and maps of magnetic isolines.—*W. A.*

3287. A valuable contribution to Klerksdorp geology [editorial note]: Min. and Ind. Mag. Southern Africa, vol. 22, no. 11, pp. 649–651, Johannesburg, 1936.

This is an extract from Dr. P. F. W. Beetz's review of the history of the exploration work of Western Reefs for 1933–36, which he read at the meeting of the Geological Society of South Africa June 23, 1936.

Concerning the geophysical survey only the magnetometric method has been used on Western Reefs areas to reveal the structure of the ground by tracing outcrops and suboutcrops of magnetic shales in the Witwatersrand beds; magnetic lavas in the Ventersdorp system; magnetic shale bands in the Dolomite; ultrabasic dikes and fissures; and certain faults.

In discussing the usefulness of magnetometric methods in the Klerksdorp district the author writes:

"The solution of two problems of economic importance is dependent upon the tracing of the footwall shale and the Jeppestown shale anomalies east of the Buffetsdoorn fault and under the cover of Ventersdorp beds west of Klerksdorp; these problems are to find the suboutcrop of the continuation of the Buffetsdoorn and of the Afrikaner Reefs respectively and to establish the possible suboutcrop of the Main Reef series.

"The downthrow of 2,500 feet on the southeast side of the Buffetsdoorn fault and the rapid increase in the thickness of the Ventersdorp beds connected with the frequent faulting west of Klersdorp has proved a formidable impediment to the magnetometric survey. The anomalies in the said areas become very faint on account of the great thickness of the covering formations and those of the Jeppestown, and the footwall shale. Only an approximate idea of the suboutcrops of these shale bands could be got, and the interpretation of the anomalies and their dip became very difficult. However, drilling on Hessie, Welgegund, and Wolverand proved that the magnetic shales, as shown by the magnetometric survey, actually occur in the areas so indicated east of the Buffetsdoorn fault and southeast of the Rietkuil syncline.

"The tracing of ultrabasic dikes helped to locate the bore holes in areas not disturbed by those dikes.

"The occurrence of magnetic lavas in a certain horizon of the Ventersdorp beds has proved very useful in unraveling the complicated structure prevailing in the important area around the Orkney mine, south of Klerksdorp."—*W. A.*

3288. Savornin, André, and Ranarivelo, André, Observation d'un orage magnétique à Ambatoabo (Madagascar) [Observation of a magnetic storm in Ambatoabo, Madagascar]: Acad. sci. Paris Comptes rendus, vol. 203, no. 16, pp. 741–742, Oct. 19, 1936.

The authors describe their observations on a magnetic storm that occurred during the magnetic survey made with the Schmidt vertical balance from July 26 to August 2, 1936, at Ambatoabo, about 60 kilometers west-northwest of Fort Dauphin. On August 1 an abnormal course of the diurnal variation was recorded. ΔZ reached $+260\gamma$ at 11:45 a. m. (against 200 mean normal value); at 4 p. m. $+325\gamma$ was observed, and at 5:45 p.m. $+545\gamma$—that is, about 300γ above the normal value. At 7 a. m. August 2 the value was $+420\gamma$, and at 9:15 a. m. $+520\gamma$. The measurements made after an interruption of 2 days had shown again normal values. In order to prevent the possibility of any error, measurements were made during the storm by two operators at intervals of 2 or 3 minutes. The variation of temperature did not exceed 5°.

The course of this phenomenon is shown on a figure in which the curves drawn from the normal data observed between July 26 and August 1 and the abnormal values obtained on August 1 and 2 are compared.—*W. A.*

3289. Savornin, André, Études géologiques et magnétiques dans la région de Tsimbolovolo [Geologic and magnetic studies in the region of Tsimbolovolo]: Gouvernement gén. Madagascar et dépendances, Service des mines, Annales géol., no. 6, pp. 69–84, Tananarive, 1936.

A brief geologic description of the region is given in the first part of the article. The second part deals with geophysical studies, including magnetic methods; measurements with Schmidt's vertical balance no. 97104, by Askania; interpretation of the results; magnetic studies of rocks; study of zones with strong anomalies; anomaly of the valleys; and anomaly north of Bemangoraka.

Savornin explains the difficulties encountered and the precision obtained by measurements: (*a*) The presence of laterite of strong and very variable susceptibility makes the interpretation of weak anomalies difficult; (*b*) the diurnal variation at a certain point cannot be deduced from the records of an observatory; and (*c*) finally, at the hours of the most regular diurnal variations the temperature is usually the highest and most irregular. This influences considerably the precision. and.

according to the author, an error of about ±20γ must be considered for Schmidt's balance of ±10γ—error observed in moderate climates.

The following general conclusions are drawn: Many valuable deposits in Madagascar are associated with ferromagnetic ores. Prospecting for these ores may certainly help in discovering them, especially mica, garnet, and some gems contained in pegmatitic deposits. The dikes in the metamorphic regions could undoubtedly be discovered in certain beds by the presence of magnetite. Great help may be obtained from magnetic prospecting in determining the places for drillings. Prolongations of the veins and dikes, their depths, and other necessary elements could also be determined in advance and at a low cost.—*W. A.*

3290. Swanson, C. V., The dip needle as a magnetometer: Soc. Petroleum Geophysicists Bull., vol. 1, no. 1, pp. 48–96, Houston, Tex., January 1936.

An account of investigations conducted with the object of testing the practical usefulness of the dip needle as a magnetometer. The paper is divided into the following parts:

1. Basic mechanical principles.
2. Corrections to observed readings.
3. Theoretical probability errors in calculated components.
4. Field data on errors in calculated components.
5. Suggested field and office methods.
6. Examples of the benefits obtained.

Twenty-five figures illustrate the article.—*W. A.*

3291. Thellier, Émile, Détermination de la direction de l'aimantation permanente des roches [Determination of the direction of the permanent magnetization of rocks]: Acad. sci. Paris Comptes rendus, vol. 203, no. 16, pp. 743–744, Oct. 19, 1936.

The following new procedure for determining the directions of the permanent magnetization of rocks is proposed by the author: The sample to be taken is cleaned with a chisel and, while it remains in its place, a wooden frame (a square 12 centimeters on a side and 5 centimeters high), the inside walls of which are covered with sheets of zinc, is put over it. The frame is filled with plaster, making the upper surface horizontal. After 10 minutes the frame is removed from the mold and may be used for preparing another sample. The direction is determined as follows: At a point a few hundred meters from the place where the samples of rocks are prepared a theodolite is installed and oriented toward the sun. On the horizontal surface of each sample a clinometer (or an alidade) is placed successively, a sight to the theodolite is taken, and the direction thus obtained is ruled on the plaster. After this a backsight to the clinometer is taken with the theodolite and the azimuth of the direction line determined.

The piece of rock dressed with plaster is then collected. By this method the author obtained a number of basalt samples from several places in Auvergne. The magnetization of these samples is then studied and the results published later.—*W. A.*

3292. von Bubnoff, S., Ein magnetisches Profil durch Vorpommern [Magnetic profile through Hither Pomerania]: Geol. Rundschau, vol. 27, no. 4, pp. 365–380, Stuttgart, 1936.

The procedure and the calculation of measurements (adjustment of instruments, temperature compensation, etc.) and the geologic results are described.

The profile of magnetic vertical intensity across Vorpommern (Stahlbrode-Treptow on the Toll) based on the measurements made by Schlomka and Schmücking is compared with the geologic profile; a good conformity between the two profiles was obtained. It was proved that the picture of Hercynian axes devised by Schuh and Richter is interspersed by transversal disturbances of northwest direction. A comparison with the region of Schuh's isanomal map of Mecklenburg adjoining at the west shows peculiar deviations, the possible causes of which are discussed. Of the three possible causes mentioned, the author decides that the most probable may be the existence of strongly magnetized intrusive bodies of laminar form in the subsoil which have an unilateral incidence and therefore appear to be displaced horizontally at the transversal disturbances. In any case this gives the best explanation of disturbances of the second order, while disturbances of the third order may have some other causes also.—*Author's abstract, translated by W. A.*

3293. Waagen, Lukas, Bemerkungen zu Forbergers Magnetischen Bodenforschungen im ausseralpinen Becken und am Alpenrand bei Wien [Remarks on Forberger's "Magnetic prospecting in the outer Alpine Basin and on the border of the Alps near Vienna"]: Bohrtech. Zeitung, vol. 54, no. 4, pp. 78–82, Wien, 1936.

A critical examination of the results obtained by Forberger. By interpreting the results of the magnetic investigations from other viewpoints, Waagen comes to the conclusion that his ideas probably agree more closely with the present knowledge of the deep structure of this region than those represented by Forberger.—*W. A.*

3294. Weiss, Oscar, Typical magnetic anomalies of Lower Witwatersrand shales and younger dikes in the Witwatersrand: Chem., Met., and Min. Soc. South Africa Jour., vol. 36, no. 9, pp. 227–234, Johannesburg, March 1936.

Through the measurements of the variations in the vertical component of the magnetic intensity it is possible to locate the approximate position of the suboutcrop of certain strongly magnetic shales of the Lower Witwatersrand system. From the magnetic anomalies the presence of the Witwatersrand beds in unknown areas can be ascertained, and their strike obtained. From the combination of the magnetic data with geology, it is possible to correlate the magnetic anomalies with well-defined geological horizons in areas where outcrops are available. By using this knowledge and the magnetic data in adjoining areas covered by younger rocks, it is possible to obtain the approximate value of the angle of dip. Using the value of the dip, together with the average thickness of the beds, it is possible to delineate the approximate zone of the suboutcrop of the Main Reef horizon. Complications and errors in these determinations can be introduced by strike and oblique faulting, both of which are typical in the area west of the known portion of the Witwatersrand.

Karroo dikes can be detected with the magnetometer, while the older dikes may or may not produce magnetic anomalies.

The intensity and polarity of the dikes may show erratic changes owing to the erratic magnetite concentration and to the effects of temperature, pressure, differential cooling, and dipping over of partly solidified portions of the dike material and induction.

It is a regular practice in the Rand to investigate the sites of deep bore holes and shafts with earth-magnetic measurements and to map the hidden dikes over new producing areas for the assistance of the laying out of the general development program.—*Author's abstract.*

3295. Weiss, O., Simpson, D. J., and Paver, G. L., Some magnetometric and gravimetric surveys in the Transvaal: Union of South Africa Dept. Mines Bull., Geol. ser., no. 7, 27 pp., Pretoria, 1936.

A preliminary statement of the results obtained in the trial of the two methods mentioned in the title under localized conditions.

The preface contains a note on the earth-magnetic and gravimetric methods of geophysical prospecting with an appendix on the densities of rock samples from the Karroo, Transvaal, Ventersdorp, and Witwatersrand systems, and a map (pl. 1) showing portions of geophysical traverses on the West Rand.

Chapter 1 describes magnetometric traverses across the Lower Witwatersrand system. Plate 2 shows the traverses with the three main anomalies. The data shown in the curves are summarized in two tables.

Chapter 2 describes a gravimetric survey of the Doornkop fault. The torsion-balance traverse (shown on pl. 3) is in an approximately north-south direction, and its position relative to the geologic features of the West Rand is shown on the map (pl. 1). The authors state that the Doornkop fault was well defined as a zone of gravitational anomalies and could be delineated by use of the torsion balance.

Chapter 3 describes a gravimetric survey of the Witpoortje fault and Lower Witwatersrand beds on Witpoortje no. 44 (pl. 4).

Chapter 4 describes the determination of the hade of the Witpoortje fault by a magnetometric survey. The relative position of the four magnetometric traverses across the Witpoortje fault on Rietvlei no. 113 are shown in diagram 1, plate 5. Diagram 2 shows the determination of the dip of the Witpoortje fault, and diagram 3 the method of estimation of the hade of the fault in this area.

Chapter 5 describes a torsion-balance survey for locating nickel-ore pipes on Vlakfontein no. 902 (pl. 6). From the results of this survey the authors conclude that the torsion balance can be successfully applied to the location and delineation of nickel-ore pipes, notwithstanding their relatively small diameters.

Chapter 6 describes a magnetometric survey of a gossan on Vogelstruisnek no. 602. Four traverses, each 200 feet long, laid down over the gossan and an isogam plan of the gossan are shown in plate 7.

Chapter 7 describes a magnetometric survey of the chromite seams on Groenfontein no. 302. Two traverses 200 feet apart were laid down over the three chromite seams, with a station interval of 40 feet, reduced to 20 feet and even 10 feet over the outcrops of the ore. The results of these traverses are shown on plate 8.—*W. A.*

3296. Weiss, O., Simpson, D. J., and Paver, G. L., Some magnetometric and gravimetric surveys in the Transvaal: Min. and Ind. Mag. of Southern Africa, vol. 22, no. 16, pp. 903–905, Johannesburg, 1936.

A review of Bulletin 7, issued by the Union Geological Survey Department, Pretoria. (See abstract 3295, above.)

The authors give extracts from the bulletin dealing with the problem of the dip of the Witpoortje fault under the following headings:

1. Note on the earth-magnetic and gravimetric methods.

2. Gravimetric survey of the Witpoortje fault and Lower Witwatersrand beds on Witpoortje.

3. The determination of the hade of the Witpoortje fault by a magnetometric survey.—*W. A.*

3297. Zhongolovich, I. D., Magnetic survey on the Pamir [in Russian]: Acad. Sci. U. S. S. R. Trans. Tadzhik Exped. 1932, no. 6, pp. 1–38, Leningrad, 1934.

Contains the following items:

1. Historical outline.

2. Itinerary (scheme of magnetic points in the region of Lakes Yashil-Kul and Sarezskoe).

3. Investigation of instruments and methods of work (Chasslon's magnetic theodolite no. 80).

4. Accuracy of determinations of the magnetic elements (34 stations of observation are described).

5. Results of magnetic observations (tables).

6. Reduction of the observed values to the epoch (1932.5).

7. Materials for maps showing the distribution of magnetic elements on the territory of the Pamir and South Ferghana.

8. Appendix: List of 104 magnetic stations.—*W. A.*

3. SEISMIC METHODS

3298. Adams, C. E., Report of the Dominion astronomer and seismologist for the year ended December 31, 1934 (extract from the Annual Report of the Department of Scientific and Industrial Research, 1934–35): Wellington Dominion Observatory Bull. 105, 7 pp.

Contains data on astronomy, seismology, and publications issued by the Observatory, also a map of New Zealand showing approximate earthquake epicenters for the calendar year 1934.—*W. A.*

3299. Birch, Francis, and Dow, R. B., Compressibility of rocks and glasses at high temperatures and pressures; seismological application: Geol. Soc. America Bull., vol. 47, no. 8, pp. 1235–1255, Aug. 31, 1936.

For six artificial glasses, for Solenhofen limestone, and for Vinal Haven diabase, the compressibility has been measured to a pressure of 10,000 kg/cm^2, combined with temperatures of 0° to 300° or 400° C. For all these materials, except silica glass, the compressibility is found to increase with the temperature above about 200°, although in a number of cases the behavior below this temperature is more or less complicated. The values observed for the diabase are notably lower than any heretofore recorded for similar rocks; estimates are given of the velocity of seismic waves in this diabase at different depths, down to 40 kilometers.—*Author's abstract.*

3300. Bois, Charles, Sur les séismes à foyer anormalement profond [On earthquakes with abnormally deep focus]: Acad. sci. Paris Comptes rendus, vol. 203, no. 1, pp. 101–103, July 6, 1936.

From the seismograms recorded in Strasbourg, the author gives a table of focal depths calculated by various authors using different methods. Bois studied the seismograms by using Wadati's tables.—*W. A.*

3301. Bois, Charles, Sur les séismes à foyer profond [On deep-focus earthquakes]: Acad. sci. Paris Comptes rendus, vol. 203, no. 4, pp. 341–343, July 27, 1936.

From the examination of seismograms recorded at Strasbourg in 1923–34, by using Wadati's tables, 57 earthquakes were determined to have had focal depths greater than 80 kilometers. The following conclusions were drawn from the examination:

1. *Geographic distribution.*—The earthquakes may be divided into two groups—(*a*) border of circum-Pacific geosynclinal and (*b*) zone of Alpine folds.

2. *Classification according to the depths.*—A table gives the number of shocks observed for various focal depths. The table is not considered to be complete, as reference is made only to distances between 3,000 and 11,000 kilometers, and the period of study did not exceed 12 years. The temporary conclusions drawn are formulated as follows: (*a*) The decrease of frequency at depths of 80 kilometers and more does not seem to follow a regular law; (*b*) the distribution of foci seems to follow certain laws at medium depths; (*c*) two maxima of frequency, one at a depth of about 120 kilometers and the other at about 320 kilometers, are noticed.

3. *Mechanism of the starting of shocks.*—The examination of seismograms obtained with the aid of vertical components makes it possible to determine whether the P phase originated with a compressional or a dilatational wave.

According to the author, the results suggest the existence between the depths of 80 and 600 kilometers of three surfaces of discontinuity, or at least of three levels at which the elastic properties of the subsoil are changing very rapidly.—*W. A.*

3302. Bradford, D. C., Microseisms and their relationship to changing meteorological conditions: Seismol. Soc. America Bull., vol. 26, no. 1, pp. 29–53, 1936.

In this paper the following conclusions have been drawn from the data at hand:

1. That the period of microseisms tends to vary with the amplitude.
2. That the various types of lows delineated in this paper vary in their degree of correlation with microseismic displacements.
3. That microseisms are under direct influence of changing meteorological conditions.

It is therefore the writer's general conclusion that the type and intensity of cyclonic depressions are the dominant factors in the propagation of microseisms.—*Author's abstract.*

3303. Bungers, Rolf, Theorie der Schwebungen [Theory of vibrations]: Zeitschr. Geophysik, vol. 12, no. 5/6, pp. 229–245, Braunschweig, 1936.

The theoretical investigation of the superposition (Überlagerung) of two harmonic oscillations of almost similar frequency requires in the first place an exact definition of the notion "variable frequency." Oscillation pictures which possibly may occur are discussed, and examples are given. Anomalous conditions, not yet discussed, may appear in the oscillation minimum. In the second chapter the author discusses oscillation pictures which appear in the modern applied geophysics and in which the partial oscillations are only approximately harmonious. In the last part the results are discussed with regard to the superposition of waves, and the mathematical analogy between the interference phenomena and vibration phenomena is determined.—*Author's abstract, translated by W. A.*

3304. Buwalda, J. P., and Gutenberg, Beno, Investigation of overthrust faults by seismic methods: Science, new ser., vol. 81, no. 2103, pp. 384–386, Apr. 19, 1935.

Attempts to measure the thickness of overthrust plates were made on the Beartooth Plateau, in northwestern Wyoming and south-central Montana, about 12 to 20 miles southwest of Red Lodge, Mont., along the new Red Lodge-Yellowstone Park highway (July 1934), and on Frazier Mountain, about 90 miles northwest of Los Angeles, Calif. (November 1934).

According to the authors the investigations clearly demonstrate that it is possible to measure the thickness of overthrust plates by use of the seismic-reflection method and from a number of such measurements to determine the form of the fault surface. The method cannot be used successfully on those parts of overthrust surfaces that separate rock bodies in which elastic wave velocities are nearly equal, because the fault itself does not reflect the waves. The best results were obtained with charges ranging from a fraction of a pound to a very few pounds.—*W. A.*

3305. Bykhovsky, V., The scales of seismic intensity [in Russian]: Acad. sci. U. R. S. S. Comptes rendus, Seismol. Inst. Pub. 73, 42 pp. 1936.

1. A review of seismic scales has shown that at the present state of science they cannot be considered to be satisfactory.

2. Methods advanced by Terada and developed by Benioff, Martel, and Suyehiro deserve the widest application and promulgation in seismic regions.

3. The seismic intensity of a given locality is to be determined from (*a*) a chart showing the distribution of epicenters of earthquakes occurring within the area; (*b*) the intensity of quakes expressed in the form of a spectrum of motion frequencies, and of respective amplitudes for different types of constructions in the locality; (*c*) the range of ground-motion frequencies prevailing during earthquakes in the locality.

4. Mathematical interpretation of all the necessary data presents no difficulties.

5. The more essential factors in designing earthquake-proof buildings are the characteristics of their dynamic behavior during the quake, mainly conditioned by (*a*) the form of vibration of the building; (*b*) the natural period of its motion; and (*c*) the period and amplitude of the earth's crust motion during earthquakes.—*Author's summary, translated by W. A.*

3306. Caloi, P., Two new types of seismic waves: R. Accad. Lincei Atti, vol. 23, pp. 507–511, Apr. 5, 1936.

If the vector, representing a seismic vibration, consists of a component along the normal of the wave (this gives place to a longitudinal movement) and also of a component normal to the direction of propagation. This, in its turn, is decomposed into two—the one lying in the principal plane, and the other normal to the plane of propagation.—*W. A. R., Sci. Abstracts, vol. 39, no. 466, 1936.*

3307. Caters, C. de, La machine à tremblements de terre [The earthquake machine]: La Nature, no. 2977, pp. 406–467, Paris, May 15, 1936.

The author gives a brief description of a device for investigating earthquakes, developed by Arthur C. Ruge in collaboration with Vannevar Bush. The machine was constructed in the Massachusetts Institute of Technology. (See abstract 3346.)

An electrical analyzer coupled with a photosensitive cell operates the machine so that the undulatory curve corresponding to that of the seismogram may be observed. Any shock of the earth is reproduced by exactly the same movement. The machine is very supple; the expensive and bulky mechanical cam is avoided; any shock, no matter how irregular it may be, is realized. According to the author, this machine shows improvements in comparison with the old ones.—*W. A.*

3308. Dahm, C. G., Velocity of P waves in the earth calculated from the Macelwane P curve: Seismol. Soc. America Bull., vol. 26, no. 1, pp. 1–11, 1936.

The Macelwane P curve is based on the data of the Tango, Hawke Bay, and Long Beach earthquakes, all of 10 to 12 kilometers focal depth. This curve was modified and adjusted to fit a spheroid of 6,355-kilometer radius, the outer part of which has the same properites as those of the material immediately under the Mohorovičić discontinuity in Japan. The original and the adjusted P curve are given as well as the velocity-depth and depth-distance data obtained by applying the Herglotz-Wiechert method to the adjusted P curve. The inversion and slight descrease of the velocity-depth function at 2,730 kilometers depth are discussed, and the continued validity of the Herglotz-Wiechert method under those circumstances is shown.—*Author's abstract.*

3309. Dahm, C. G., Velocities of P and S waves calculated from the observed travel times of the Long Beach earthquake: Seismol. Soc. America Bull., vol. 26, no. 2, pp. 159–171, 1936.

Comprises the results of calculations of the velocities of P and S waves based on the measurements of original seismograms or contact prints from 60 stations in all parts of the world. The article is accompanied by a series of curves and six tables.—*W. A.*

3310. Davison, Charles, Post-eruptive movements of the earth's crust: Discovery, vol. 17, pp. 148–149, London, May 1936.

Davison records in this article some interesting observations on the post-eruptive movements of the earth's crust in Japan. A few maps show the depressions of the earth's crust and movements of the crust blocks around Sakura-jima, and graphs are given of changes of level in Japan as revealed by precise leveling. Reference is made to the papers published by Omori, Imamura, Tsuboi, and Miyabe.—*W. A.*

3311. Luca Moro, F. P. de, Possibilities of the seismic method in the study of elastic reflected waves: Bol. inf. petroleras, vol. 12, no. 140, pp. 25–28, Buenos Aires, April 1936.

Reference is made to a previous article, in which the author recommended research to identify the longitudinal and latitudinal waves and separate them from one another, and also to identify the angles of emergence. It is now claimed that the Ambronn piezo-quartz seismograph has succeeded in getting a reception of the reflected waves, by variation of the amplitude of the vibrations, eliminating the natural and artificial microseisms and the large waves, and by limiting, in some cases, the filtrations. This application of the known electrical properties of quartz is not new, but Ambronn was the first to introduce it with success into applied geophysics, and by his seismograph he has created the possibility of applying all the discoveries of modern electric technique to amplification, filtration, and recording of electric oscillations. This evolution of an instrument susceptible of recording electric reflecting waves is very far from realizing perfection in seismic reflection methods, as has been shown by practical field tests. It was found that, according to the geologic structure, an adaptation of the filter for each special case was necessary. The field work led to the conclusion that by applying the reflection method the observer could utilize the times of arrival of the longitudinal reflection waves to procure a clear record of them, in consequence of the elimination, by means of filters, of the latitudinal waves of low frequency, which would otherwise have so confused the reception that identification of the longitudinal waves would have been impossible. When the latitudinal waves are of low frequency and the longitudinal of high frequency, it is very simple, by means of filters, to eliminate the perturbing frequencies. But in some areas the highest frequencies of the longitudinal waves are absorbed, leaving only the low frequencies, and then a system that eliminated or reduced the latitudinal waves of low frequency would defeat its object by eliminating or reducing also the longitudinal waves of low frequency, thus creating the false impression that a horizontal reflector did not exist. Thorough research on this problem has been undertaken by well-known geophysicists experimenting with new models of seismographs fitted with microphonic cells and with the latest systems of mechanical, acoustic, and electric filters. The progress of their work urges the author to stress the importance of close collaboration, or even alliance, of seismic and geoelectric research. With the aid of a diagram, the author outlines the principles on which a process ought to be evolved whereby a good record of reflected waves could be obtained, and combining with that the fullest utilization of the seismic energy. It is pointed out finally that the extraordinary progress made in the field of electric measurements opens the door to the possibilities of great achievements by modern electrotechnique and that instrumentation, being of supreme importance in applied geophysics, is the reason for the great oil companies having organized special laboratories where apparatus invented therein are tested and all new inventions examined.—*Condensed from B. F. N. M., Inst. Petroleum Technologists Jour, vol. 22, no. 155, September 1936.*

3312. Einaudi, R., Seismic waves: Accad. sci. Torino Atti, vol. 71, no. 1, disp. 2a, pp. 299–309, January-April 1936.

The first phase of the principal seismic waves can be explained mechanically without recourse to the hypothesis of a lithosphere overlying a fluid magma.—*W. A. R., Sci. Abstracts, vol. 39, no. 465, 1936.*

3313. Grenet, G., and Coulomb, J., Construction d'un seismographe d'essai [Construction of a trial seismograph]: Inst. et obs. de physique du globe du Puy-de-Dôme Bull. 8, 6 pp., 1935–36.

As a result of theoretical research the authors constructed a trial seismograph. In this article, which is the first of a series in connection with this work, the authors give a description of the apparatus. Some details accompanied with a photographic picture and a schematic design are given. The working of the seismograph is explained briefly.—*W. A.*

3314. Gutenberg, B., Microseisms: Seismol. Soc. America Bull., vol. 26, no. 2, pp. 111–117, April 1936.

The various suggestions as to the origin of microseisms are discussed, and it is shown that the only probable cause that produces sufficient energy and can be correlated with recorded microseisms is surf on a steep coast—for example, on the coasts of Norway, Alaska, and British

Columbia, and of Labrador, for microseisms recorded respectively in northern and western Europe, at Pasadena and its neighborhood, and eastern United States.—*C. A. S., Sci. Abstracts, vol. 39, no. 465, 1936.*

3315. Gutenberg, B., and Richter, C. F., Revised and additional geocentric coordinates of seismological stations: Gerlands Beitr. Geophysik, vol. 46, no. 1/2, pp. 198–201, Leipzig, 1935.

In a recent paper (Gerlands Beitr. Geophysik, vol. 40, p. 380, 1933), the authors published a list of selected seismologic stations with verified coordinates, including geocentric latitudes and heights above an arbitrary sphere. Comparison with the publication by K. E. Bullen (The constants of seismological observatories, 1933) revealed certain discrepancies, which have been investigated by the authors by direct correspondence with the stations concerned. A few stations were removed to new positions, and other new installations were made. The authors give tables showing corrections, changes, and additions to the previous list.—*W. A.*

3316. Gutenberg, B., and Richter, C. F., On seismic waves (third paper): Gerlands Beitr. Geophysik, vol. 47, no. 1/2, pp. 73–131, 1936.

In two previous papers under the same title (Gerlands Beitr. Geophysik, vol. 43, p. 56, 1934; vol. 45, p. 280, 1935; see Geophys. Abstracts 71 and 83) the authors have presented data on bodily waves. The present paper contains the corresponding data on surface waves (including seismic sea waves), the magnitude and energy of earthquakes, and miscellaneous topics. The seismograms used were those studied in the previously published investigations; the numbers assigned to individual shocks are as given in the previous paper.—*W. A.*

3317. Gutenberg, B., and Richter, C. F., Magnitude and energy of earthquakes: Science, new ser., vol. 83, pp. 183–185, Feb. 21, 1936.

The authors point out the necessity of grading earthquakes in catalogs according to the magnitude of the shock. Indiscriminate use of instrumental data gives undue weight to minor shocks. Using their own arbitrary scale, they find that in California the minor shocks account only for a very small part of the liberated energy. The smaller shocks do not appreciably mitigate the strains which are released in the larger earthquakes, but must be regarded as minor incidents in and symptoms of the accumulation of such strains.—*W. A. R., Sci. Abstracts, vol. 39, no. 461, 1936.*

3318. Hagiwara, Takahiro, The air damper: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 4, pp. 783–789, December 1935.

Discusses the effect of the compressibility of the air on the resisting force of the dampers. The resisting force exerted by the ordinary damper is calculated by taking into consideration the compressibility of the air as well as its rate of flow between the piston and the containing cylinder, and the most suitable dimensions for various rates of vibration of the seismoscope are determined.—*W. A.*

3319. Hayes, R. C., Focal depth of the Hawkes Bay earthquake of February 2–3, 1931: Nature, vol. 138, no. 3481, pp. 126–127, London, July 18, 1936.

In view of the divergence in the interpretation of the seismograms of the Hawkes Bay earthquake of 1931 and the calculations of the focal depth therefrom, R. C. Hayes has reexamined the original Takaka seismogram. Its record, he states, confirms in the main the original interpretation, from which a focal depth of 16 to 24 kilometers was inferred.—*Editor's summary.*

3320. Hayes, R. C., Seismic waves and crustal structure in the New Zealand region: Wellington Dominion Observatory, Dept. Sci. and Ind. Research, Bull. 101, pp. 1–10, 1936.

Observations of 10 well-recorded New Zealand earthquakes during the period 1931–34 indicate a continental crustal structure in the New Zealand region resembling that postulated by Jeffreys for the European Continent, but with velocities distinctly higher than those found in typically continental regions.

Based on the suggestion by Gutenberg regarding the significance of deep-focus earthquakes, the observations of such earthquakes in the southwest Pacific to date support the evidence of crustal structure obtained from the observations of seismic waves.

Geological evidence favors the existence of a continental crust in the New Zealand region.

The relatively high velocities of seismic waves suggest a feature in common with "Pacific" crust alstructure.—*Author's abstract.*

3321. Hayes, R. C., A new phase in deep-focus earthquakes: Wellington Dominion Observatory, Dept. Sci. and Ind. Research, Bull. 107, pp. 553–562, 1936.

A prominent phase appearing a few minutes after ScS on the Milne-Shaw seismograms at the Dominion Observatory, Wellington, of seven abnormally deep-focus earthquakes in the southwest Pacific has been identified as a transverse wave reaching the station after having been reflected, first at the earth's surface near the epicenter and then at the boundary of the core. The designation of such a phase in accordance with current nomenclature is sScS. This phase does not appear to have been recognized on any previous occasions. It is similar in character to ScS, and both phases are of remarkably large amplitude on some of the records. The time interval (sScS–ScS) provides a comparatively accurate method for determining the focal depths of abnormally deep earthquakes from a single seismogram at short distances, the interval for a given depth being practically independent of epicentral distance.—*Author's abstract.*

3322. Hayes, R. C., Normal and deep earthquakes in the southwest Pacific: Wellington Dominion Observatory, Dept. Sci. and Ind. Research, Bull. 109, 1936.

Presents as complete a list as possible of deep earthquakes in the southwest Pacific during the period 1918–34, also some statistics showing the distribution of these earthquakes in space and time, as compared with the distribution of normal earthquakes. Discusses the general distribution of deep earthquakes and deep-focus earthquakes and geophysical problems.—*W. A.*

3323. Hayes, R. C., Earthquakes and atmospheric pressure: Wellington Dominion Observatory, Dept. Sci. and Ind. Research, Bull. 110, 1936.

Investigation of atmospheric-pressure changes associated with the occurrence of 75 of the principal New Zealand earthquakes during the period 1931–34 shows a tendency for earthquakes to be more frequent when pressure is above 30 inches than when it is below that value. This is most marked in the case of earthquakes in the Buller region of the South Island. Pressure changes at intervals within 12 hours before earthquakes show that slightly more earthquakes occur after a fall of pressure than after a rise.—*Author's abstract.*

3324. Ide, J. M., The elastic properties of rocks—a correlation of theory and experiment: Nat. Acad. Sci. Proc., vol. 22, no. 8, pp. 482–496, August 1936.

Dynamic measurements of the modulus of rigidity of rocks are described. These are computed from the torsional resonance frequencies of cylindrical samples.

Dynamic measurements of Poisson's ratio are discussed. These are obtained from the deviation of the longitudinal harmonic frequencies from integral multiples of the fundamental and are found to agree with values computed from Young's modulus and the modulus of rigidity.

The relations between the elastic constants determined in the laboratory and the theoretical formulas, which express the connections between the constants of a perfect elastic medium, are discussed in detail. It is found that $E\beta=3E/\mu$, computed from experimental values, is smaller than the theoretical formula predicts, for all the rocks investigated except diabase. There is agreement between theory and experiment to 1 percent for diabase, copper, and steel. It appears that the values of Poisson's ratio determined from E/μ, static measurements and harmonic series, are relatively much lower than those calculated by means of the formulas involving $E\beta$ or V/ν. It is found, finally, that field measurements of elastic-wave velocities in the Sudbury norite agree to approximately 1 percent with velocities computed from $E\beta$, and to approximately 5 percent with velocities computed from E/μ. The check with field determinations for granite is within 7 percent for velocities computed from $E\beta$, and within 19 percent for velocities computed from E/μ.—*Author's abstract.*

3325. Inouye, Win, Some experiments on the waves generated by the rotation of some eccentric masses [in Japanese]: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 4, pp. 757–762, December 1935.

The waves were generated in the ground by the rotation of an eccentric mass driven by an electric motor. The frequency of the rotation of this electric motor was changed within some range by changing the eccentric mass. The waves were projected to the canal dug in the ground. The amplitudes of the horizontal component of the vibrations of the surface of the ground and the base of the canal were observed by transporting a horizontal seismometer from one place to another.

The author observed the standing waves existed by the reflections of the waves from the canal, in spite of several times lesser dimensions of the depth and the breadth of the canal than the dimensions of the wave lengths. Moreover, it seems to the author that the observed waves are the surface waves of Rayleigh type.—*Author's English abstract.*

3326. Ishimoto, Mishio, Acceleration observations of seismic shocks in the cities of Tokyo and Yokohama [in Japanese]: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 3, pp. 592–607, September 1935.

Acceleration observations were continued during 1934. The author succeeded in recording 15 earthquakes of order 2 and 2 of order 3. The maximum acceleration of each quake was determined and is shown in a figure. On the one hand it was greater at the elevated part of the city when the epicentral distance was less than 50 kilometers. The predominant period in the seismic shocks was, on the other hand, comparatively small at the elevated parts of the city. We established that the predominant period corresponded to that of the proper oscillation of the superficial layer and was in close connection with the damages caused by earthquakes. We tried to find some relation between the periods of earthquakes produced artificially and the predominant period of seismic shocks, but did not find any agreement between them.—*Author's French summary, translated by W. A.*

3327. Ishimoto, Mishio, Construction d'un microséismographe méchanique [Construction of a mechanical microseismograph]: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 14, no. 2, pp. 248–258, June 1936.

The inconveniences of optical registration of shocks of small amplitude are mentioned: (1) The direct reading of the records during the observation is impossible; (2) the size of the curve recorded is generally very great; and (3) a certain speed is to be given to the photographic paper rolled up on a revolving drum in order to be able to record the oscillations of small periods. With these considerations in mind, the author constructed a mechanical microseismograph. The pendulum, a cylinder weighing 33.9 kilograms, 40 centimeters long and 10 centimeters in diameter, is inverted and held in position by two flattened steel springs; the pointer, recording movements on smoked paper, is attached to the second of two amplifying levers, giving a total amplification of about 350. The instrument is about 300 times as sensitive as the accelerometric seismograph in ordinary use.—*W. A.*

3328. Jeffreys, H., Structure of the earth down to the 20° discontinuity: Royal Astron. Soc. Monthly Notices, Geophys. Suppl. 3, pp. 401–422, London, April 1936.

The ordinary integral equation that gives the velocity of P and S waves requires too many doubtful assumptions for its solution. The structure of the earth above the recently discovered discontinuity at 20° is attempted by the methods for near earthquakes. The velocities of various forms of the P waves are calculated and tabulated.—*W. A. R., Sci. Abstracts, vol. 39, no. 463, 1936.*

3329. Jeffreys, H., Comparison of seismological stations: Royal Astron. Soc. Monthly Notices, Geophys. Suppl. 3, pp. 423–443, London, April 1936.

The standard of accuracy varies from one seismological station to another. The author applies his system of weighting to all the important stations of the world and tabulates the results.—*W. A. R., Sci. Abstracts, vol. 39, no. 463, 1936.*

3330. Jeffreys, Harold, On travel times in seismology: Union géod. et géophys. internat., Assoc. séismologie, Nogent-le Rotrou (France), sér. A, no. 14, pp. 3–86, 1936.

The data contained in the author's recent work with K. E. Bullen on travel times (see Geophys. Abstracts 77) have been rediscussed and combined with those of several special studies, particularly by Scrase, Stechschulte, and Dahm. Five European earthquakes, all well observed at short distances, have been added. A systematic method is provided for dealing with the abnormal low of errors that appears to hold in seismological observations. The standard errors of the resulting tables have been found. The discontinuity in the slope of the time curve for *P* has been substantiated; the *Z* phenomenon, a variation in the arrival times of *S* and *SKS* with respect to *P*, without the effect of focal depth showing in the *P* residuals, when considered alone, is also confirmed. Deep-focus shocks have been used to give times of the pulses reflected on the outside of the core, which have been combined with those of the principal core waves to give times within the core, and the times of several other core waves have been computed.

The changes from the times already given are in most cases small, and the final results for the fundamental pulses *P*, *S*, *SKS*, and *P′* appear trustworthy to a second or less at most distances. Substantial changes are made in P'_2, in *SKKS* at great distances, and *ScS* at short distances. Certain anomalies in the recorded times of arrival of *S* are discussed.—*Author's abstract.*

3331. Jost, Wilhelm, Die seismischen Eisdickenmessungen am Rhonengletscher, 1931 [Seismic measurements of the thickness of ice on the Rhone glacier in 1931]: Schweizer. naturf. Gesell. Denkschr., vol. 71, no. 2, pp. 29–42, Zürich, 1936.

The seismographs used and their characteristics are briefly mentioned. General remarks on the method of measurement (developed by Mothes) are given. The reflection method and the refraction method are described and compared with respect to the shooting distances. The accuracy of measurements was estimated to be within 2 percent. The results of measurements are shown in a table and a series of profiles. A description of the Rhone glacier based on the investigations is given. The greatest depth of the ice measured was 237 meters. Ten figures and one map are added.—*W. A.*

3332. Kawasumi, Hirosi, and Syosaku, Homma, On a problem concerning the earth as discussed from the time-distance curve of the Formosa earthquake of April 20, 1935: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 14, no. 2, pp. 201–221, June 1936.

Discuss the problem of the existence of discontinuity surface in the mantle of the earth from the examination of the P curve due to the Formosa earthquake of April 20, 1935. The epicenter is determined by the method of least squares. The velocity distribution within the earth, as well as the depth of vertex of the seismic ray emerging at any epicentral distance up to about 20 meters or so, is determined upon the two assumptions of the existence of the velocity discontinuity of first and second order.—*W. A.*

3333. Koch, H. W., and Zeller, W., Der Einschwingvorgang bei Erschütterungsmessgeräten [The process of the original oscillation in seismographs]: Zeitschr. Geophysik, vol. 12, no. 5/6, pp. 220–228, Braunschweig, 1936.

A discussion of the original conditions and of the theory of the original oscillation process is followed by three practical examples. The theory of the original oscillation process may be based on the process of the increase of oscillation. In this case the practical example can be well explained. If a pure sinus oscillation and not the increase process of oscillation is applied the theoretical results can be proved, as far as seismometers are concerned, only on the oscillation table. The theory established agrees sufficiently well with the real phenomena appearing in the practice of measurements.—*W. A.*

3334. Köhler, R., Dispersion und Resonanzerscheinungen im Baugrund [Dispersion and resonance phenomena in building foundations]: Zeitschr. tech. Physik., vol. 16, no. 12, pp. 597–600, 1935.

The propagation of sinus-shaped stationary oscillations shows dispersion phenomena that agree well with the theory of Rayleigh waves. In case of shocklike oscillations (explosions) the initial shocks are represented on the seismograms as longitudinal waves; then two kinds of shear waves follow. The velocity of the shear wave arriving first increases (as in stationary oscillations) with the decreasing frequency; the velocity of the other shear waves, on the contrary, decreases with the decreasing frequency. The end of the seismogram is represented by the proper oscillation of the underground which dies away according to e-function, probably owing to the dispersion of the energy into deeper layers. A conclusion on the nature of the underground may be drawn from the phenomena of dispersion and from the dying out of the proper oscillations.—*Abstract by K. Jung (Geophysikal. Berichte, 1936, p. 69), translated by W. A.*

3335. Köhler, R., Messung der Schwingungskennziffern und Herabminderung der Erschütterungen in einer Kohlenwäsche [Measurement of characteristic oscillation figures and the reduction of oscillations in a coal-washing plant]: Zeitschr. Geophysik, vol. 12, no. 4, pp. 148–166, Braunschweig, 1936.

The characteristic oscillation figures caused by the machinery of a coal-washing plant 40 meters high and 72 meters long were measured. The building oscillated in the longitudinal as well as transversal directions with the oscillation figures characteristic of the plant as a whole. Suitable steps for reducing the oscillations were derived from the measured resonance curves, and the effect of the oscillations was examined. A decrease of 77 percent in oscillation of the building was obtained by an increase of 11 percent in the number of revolutions of machines by which the main oscillations were caused. The oscillation properties of the building could be observed the best by sudden switching off the machines.—*Author's abstract, translated by W. A.*

3336. Lamont, A., Paleozoic seismicity: Nature, vol. 138, no. 3484, pp. 243–244, London, Aug. 8, 1936.

Indications of the occurrence of earthquakes and of accompanying seismic sea waves (tsunamies) in Ordovician time (Caradog age) are described from observations of strata in the Irish Free State. These may involve revision in the interpretation of certain features, such as crush conglomerates and intrusive tuffs, the origin of which has hitherto been ascribed to other agencies.—*Abstract on page 250 of the same number of Nature.*

3337. Leet, L. D., Seismological data on surface layers in New England: Seismol. Soc. America Bull., vol. 26, no. 2, pp. 129–146, 1936.

The Harvard seismograph station has undertaken a special study of the surface layering in New England. As a preliminary to this, the effects of an average crust on seismological data are considered. For this purpose, R. A. Daly outlined a crust representative of the best available figures from investigations in other regions. An important feature of this structure, which should find expression in seismological data, is a decrease in velocity at one discontinuity.

A preliminary analysis of waves from timed quarry blasts at distances up to 187.5 kilometers is offered. It suggests a surface zone of $V_p=$ 6 km/sec., $V_s=3.5$ km/sec., bounded by a discontinuity at a depth of 23 kilometers, below which $V_p=8$ km/sec., $t_p=4.9+\Delta/8$, $V_s=4.6$ km/sec., $t_s=8.3+\Delta/4.6$. The tentative nature of the interpretation is emphasized. The postulated structure is not confirmed at any point, with the exception of poor but possible indications of a low-speed layer. Rayleigh waves are described, showing some anomalous features, but a detailed discussion of wave types is reserved for a later report.

Ambiguities and conflicts of opinion in interpretations of near-earthquake data are cited, with special reference to certain reports of H. Jeffreys, to suggest that the fact that so many records of blasts and near earthquakes in scattered areas fail to conform to the requirements of Jeffreys' surface layers, or similar structures, may be due to differences of methods and inadequacy of data, as much as to regional differences of structure.—*Author's abstract.*

3338. Lehmann, J., P^1 waves: Union géod. et géophys. internat. Trav. sci., sér. A, no. 14, pp. 87–115, Toulouse, 1936.

In four records at distances of about 150° pulses have been read which seem to indicate that there are four distinct P' waves at this distance. The first, small wave, recorded on vertical-component instruments only, is likely to be due to small shocks preceding the main shock. The second wave, which is not very large, has been interpreted as the P^1 wave of the main shock, recorded also at greater distances. At smaller distances the same wave is recorded as P^1_3. The movement arising from the third and fourth waves is very large. The phases have been interpreted as the upper P^1_1 and the P^1_2 phases. This interpretation presupposes the existence of an inner core. It cannot be maintained that the interpretation here given is correct, since the data are quite insufficient, and complications arise from the fact that small shocks have occurred immediately before the main shock. However, the interpretation seems possible, and the assumption of the existence of an inner core is, at least, not contradicted by the observations; these are, perhaps, more easily explained on this assumption.—*Author's abstract.*

3339. Lorenz, Dr., Dynamische Baugrund-untersuchungen für den Industriebau [Dynamic foundation investigations for industrial constructions]: Öl und Kohle, vol. 12, no. 18, pp. 387–389, Berlin, 1936.

Results obtained during recent years in investigating construction sites. The investigations were applied mainly in the following two fields:

1. General research was carried out for determining the foundation chosen for a building, such as the sequence of the strata, and their thickness, for the purpose of determining the bearing power of the various strata and the possible gradual sinking of the future construction.

2. The second investigation was made with the purpose of determining the elastic properties of the foundation soil, on the basis of which the oscillations of machines used in the erected buildings could be calculated in advance.—*W. A.*

3340. Matuzawa, Takeo, Seismometrische Untersuchungen des Erdbebens vom 2. März 1933; Erdbebentätigkeit vor und nach dem Grossbeben; Allgemeines über Nachbeben [Seismometric investigations of the earthquake of March 2, 1933; Seismic activity before and after the main shock; General remarks on the aftershock]: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 14, no. 1, pp. 38–67, March 1936.

Seismometric investigations were based on the data obtained in the region of Sanriku-Oki. The following questions were considered: (1) Seismic activity in Sanriku-Oki; (2) periodicity of the frequency of earthquakes; (3) temporal course of frequency of earthquakes after the main shock; (4) investigations in the daily fluctuations of after-shocks; (5) spatial distribution of epicenters in the region of Sanriku-Oki in 1933; (6) succession of the origin; (7) lapse of time of frequency of after-shocks of the North Isu earthquake of November 26, 1930; (8) tides of the sea and frequency of earthquakes; (9) main earthquakes and spatial distribution of after-shocks. The article has 17 figures and 13 tables.—*W. A.*

3341. Mills, Brad, No pollution problem in development of submerged leases along coastal belt: Oil Weekly, vol. 81, no. 11, pp. 17–23, Houston, Tex., 1936.

Describes geophysical prospecting by seismic survey on leases in Galveston Bay. The equipment consisted of a large houseboat which served as a recording station, a barge for drilling the test holes, and subsidiary craft for the use of the testing crew. The test holes were drilled at 1-mile intervals. The explosive charge was half a pound to 2 pounds of dynamite. The shock from the charge was not great enough to be felt at the surface; no marine life was destroyed.—*W. A.*

3342. Nash, H. E., and Martin, J. M., Explosives theory for the geophysicist: Explosive Engineer, vol. 14, no. 7, pp. 200–213, Wilmington, Del., 1936.

Some fundamental properties of explosives with special reference to geophysical prospecting are discussed, such as (1) pressure developed in the drill hole when an explosive charge is detonated, (2) the temperature of the explosive gases, (3) the amount of available energy released, and (4) the proportion of this energy that is converted into useful seismic energy at the shot point.—*W. A.*

3343. Nishimura, Genrokuro, On the effect of discontinuity surfaces on the propagation of elastic waves [in Japanese]: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 3, pp. 540–554, September 1935.

In the present paper are studied the vibratory motions of a surface layer and a subjacent semi-infinite elastic body when a dilatational wave is obliquely incident on the common boundary where the two solids adhere closely. In the first chapter are studied the general properties of free waves propagated in the two solids—namely, in the surface layer and the subjacent solid—when a dilatational wave of harmonic wave type of infinite extent is obliquely incident on the bottom surface of the surface layer. In the second chapter are explained analytically the general phenomena of wave motion in the two solids when a dilatational wave of shock-wave type is obliquely incident on the common boundary.—*Author's English summary.*

3344. Nisimura, Eiiti, Vibrations of the Aso Volcanological Laboratory building and its surrounding ground: Kyoto Imp. Univ., Coll. Sci., Mem., ser. A, vol. 19, no. 4, pp. 191–206, July 1936.

The ordinary vibrations of the tower of the Aso Volcanological Laboratory and its surrounding ground were observed with five horizontal and two vertical-component microseismographs of very high magnification (about 20,000 maximum), and the following results were obtained:

1. The periods of prevailing vibrations observed are as follows:

The fundamental volcanic rock	0.55^s.
The superficial volcanic ash-layer	0.32^s and 0.10^s.
The building:	
North-south	0.34^s and 0.43^s.
East-west	0.37^s and 0.50^s.
Vertical	0.32^s and 0.20^s.

2. The amplitudes of oscillations observed in the superficial ash layer suffer a rapid decrease in nearly exponential form with increasing depths. The shorter the period of oscillation, the greater the decrease of the

amplitude. The amplitudes in the vertical component decrease less than those in the horizontal component.

3. The ordinary vibrations observed in the tower of periods ranging from 0.34ˢ to 0.37ˢ show considerably larger amplitudes in an east-west direction than those of the north-south direction. On the other hand, the shorter elastic vibrations of the tower of 0.13ˢ periods are conspicuous in the north-south direction. Thus the building behaves differently in different directions, its motions being characterized by its structural configuration.

4. Simple beatlike vibrations of 0.35ˢ periods were observed in the tower and at positions adjoining it. These vibrations are regarded as bounding vibrations of the tower, probably generated by the sudden sinking of the ground beneath the tower.

5. The building vibrates somewhat elastically in the lateral and the vertical directions.

6. The motion of the ground immediately surrounding the building is influenced by its vibrations, but beyond such distances from the building as are comparable to its length the motions are not even slightly influenced by the vibrations of the building, even when excited by a severe wind.

7. A stone weighing 160 kilograms was dropped at a ground position near the building, and vibrations generated by it were observed in and outside the building. The azimuths of these vibrations, their wave length being about half the length of the building, were strongly deflected from their normal planes of vibration by the effect of the lateral vibrations of the wings of the building, the elastic vibrations of the tower, and other disturbances. Thirteen seismograms are added.—*Author's abstract.*

3345. Rozova, E., Construction of travel-time curves and determination of the fundamental seismic elements for Central Asia [in Russian]: Acad. sci. U. R. S. S., Inst. séismol., Pub. 72, 28 pp., Leningrad, 1936.

A time-distance graph and fundamental seismic elements for Central Asia are derived from data furnished by the seismic network of Central Asia from 1929 to 1933. The epicenters of the earthquakes were determined by the method of hyperbolas. The results are summed up by the author as follows:

1. Formula for computation of the first impulse of the quake from the arrival of P waves:

$$t=9+\frac{\Delta}{7.81}$$

2. Velocities of propagation of seismic waves (apparent):

	Km./sec.
Longitudinal normal waves P	7. 82
Longitudinal intermediary waves P*	5. 99
Longitudinal individual waves P	5. 54
Transverse intermediary waves S*	3. 79
Transverse individual waves S	3. 29

3. Two focal surfaces—one at the depth of 25 kilometers ± 5 kilometers and the other at the depth of 40 kilometers ± 5 kilometers—were found.

4. The first surface of discontinuity, or the thickness of the first layer, is estimated at 17 to 25 kilometers.

5. The second main surface of discontinuity was found to be at the depth of 40 to 50 kilometers.

If we admit, according to H. Jeffreys, that the upper layer in Central Asia is constituted of granite or similar rocks, and the second layer of basalt, we may declare that the main area of foci is the boundary between the layer of granite and that of basalt.—*Author's abstract.*

3346. Ruge, A. C., A machine for reproducing earthquake motions direct from a shadowgraph of the earthquake: Seismol. Soc. America Bull., vol. 26, no. 3, pp. 201–206, July 1936.

The new earthquake machine developed at the Massachusetts Institute of Technology does away with the expensive and cumbersome mechanical cam drives and yet has no limitations with respect to the irregularity of an earthquake it can reproduce. Furthermore, it can reproduce nonrepeated irregular motions which continue for so long a time that no mechanical cam could be made for producing them.

The principles of operation are explained with the aid of the schematic diagram. The primary driving power of the machine is derived from oil under pressure working against a piston connected to the moving table. The cylindrical valve controls the oil flow by means of a set of matched parts, so that the shaking table moves in the direction the valve is opened, the speed of the motion depending upon how far the valve is opened. A coil attached to the cylindrical valve moves in a strong magnetic field. By passing current through this coil forces tending to move the valve are produced (a ¾-ampere current produces a 45-pound pull on the valve).

The author notes that the valve is quite free, having no restoring force whatever to return it to its closed or center position. To make the table reproduce arbitrary motions it is only necessary to discover how to control properly the currents flowing in the driven coil.

The control of the valve is described. A picture of the table in operation is given. The design of the machine was developed in consultation with Dr. Vannevar Bush.—*W. A.*

3347. Sassa, Kenzō, Micro-seismometric study on eruptions of the volcano Aso: Kyoto Imp. Univ., Coll. Sci., Mem., ser. A, vol. 19, no. 1, pp. 11–56, 1936.

Detailed description of studies on the eruptions of the volcano Aso; accompanied by a great number of pictures, seismograms, tables, and maps. It is not difficult to forecast the commencement of an active period of the volcano as well as its intensity, and even the commencement of an eruption group in an active period, if it is constantly observed with micro-seismometers and tiltmeters. There are some other interesting problems concerning the mechanism of volcanic activity, the study of which may be extended to other branches of geophysics.—*W. A.*

3348. Sassa, Kenzō, Anomalous deflection of seismic rays in volcanic districts: Kyoto Imp. Univ., Coll. Sci., Mem., ser. A, vol. 19, no. 2, pp. 65–78, March 1936.

A preliminary report on the anomalous structure of the upper crust in volcanic districts, based on the data accumulated in the Beppu Geophysical Laboratory and Aso Volcanological Observatory. Results of observations are shown in a table. Figure 1 shows the azimuthal distribution of the angle of deflection of seismic rays observed. A comparison between the records of earthquakes registered by the Wiechert seismographs and by the carefully adjusted microseismographs, type G_A, was made at the Aso laboratory and is shown in a table. In another table the author gives the results of the comparison made between the records of earthquakes registered by the Wiechert seismograph and by the Omori portable tremor recorder. In all cases it was proved that the anomalous deviations obtained could not be attributed to instrumental or observational errors. Therefore the main causes for the anomalous deflections must be due to the anomalies in the geologic structure of the upper crust in the two volcanic districts described.—*W. A.*

3349. Sawdon, W. A., New geophysical method provides reliable data for structure mapping: Petroleum Engineer, vol. 8, no. 1, pp. 25–29, Dallas, Tex. October 1936.

A new method of seismic prospecting that segregates the reflected waves and permits their proper identification, developed by the Rieber laboratory in Los Angeles and named the Rieber geo-sonograph method, consists of a new method of recording and means for transferring the field record into a visual record. Ten receptors are arranged in an appropriate pattern on the earth's surface and the wave impulses picked up by all 10 are photographed on a strip of 35-millimeter film in the form of 10 sound tracks. Though this variable density record on the film may be inspected visually, it is especially adapted to electro-optical analysis and therefore is run through a specially designed apparatus that sums up the wave impulses and records them in a clearly defined line. By means of this analysis, the difference in time of arrival at successive receptors and the total travel time to any point in the receptor group may be found mechanically from the variable density record without the intervention of human observational errors. The field crew used in this new method is about equivalent in numbers to that used in other reflection work. The drilling requirements also are about the same except that shallower shot holes may be used. The speed of operation in the field probably is a little greater than that obtainable with the other reflection methods. The article is accompanied by 10 figures.—*W. A.*

3350. Schmerwitz, Gerhard, Der Koppelungsfaktor bei galvanometrisch registrierenden Seismographen [The coupling factor in galvanometrically recording seismographs]: Zeitschr. Geophysik, vol. 12, no. 5/6, pp. 206–220, Braunschweig, 1936.

Galvanometrically recording seismographs are systems with damping coupling. A theoretical deduction of the process of movement undisturbed from the outside results in the fact that owing to the coupling two natural vibrations of varied frequency and damping appear in this system simultaneously. In case of a strong coupling (coupling factor almost 1) the damping disappears almost entirely for one oscillation, while the other oscillation becomes strongly aperiodical. This result of calculations is proved by the experiments carried out for this purpose. By applying the usual Calitzin arrangement the coupling factors are approximately between 0.1 and 0.5. The disturbances appear here only in a weaker form. The new designs of the instruments of this kind with small seismometer mass (it is proved that the ratio of the moments of inertia is decisive) do not possess, owing to the coupling factor, any simple harmonic natural oscillation. Therefore an indisputable interpretation of seismograms recorded by these instruments cannot be secured.—*Author's abstract, translated by W. A.*

3351. von Schmidt, O., Zur Theorie der Erdbebenwellen; Die "wandernde Reflexion" der Seismik als Analogon zur "Kopfwelle" der Ballistik [Contribution to the theory of earthquake waves; The "wandering reflection" of seismics as an analog to the "head wave" of ballistics]: Zeitschr. Geophysik, vol. 12, no. 5/6, pp. 199–206, Braunschweig, 1936.

The author's theory of "wandering reflection" was imperfect as yet owing to the fact that analogous processes were seemingly not existent in physics. The author shows that the "head wave" in ballistics represents an analog not only qualitatively but also with respect to formulas; in seismics as in ballistics a "head wave" appears only when there is an oversound velocity (Überschallgeschwindigkeit); in this case sin $a_0 = V_1/v_2$. The "wandering reflection" is further generalized with the spreading process in short waves and with the total reflection in optics.—*Author's abstract, translated by W. A.*

3352. Sezawa, Katsutada, and Kanai, Kiyoshi, The M_2 seismic waves: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 3, pp. 471–475, September 1935.

From their previous studies (see Geophys. Abstracts 75) the authors have found that there were two dispersion curves of Rayleigh waves of different types for a stratified body, particularly when the elastic constants of the stratum differed greatly from those of the subjacent medium. In the present paper they show that it is still possible for two dispersion curves to exist even where the differences in the elastic constants and in the densities of the media are not very marked. The existence of these M_2 and M_2' waves in actual seismic disturbances was confirmed by the seismic record of the India earthquake of January 15, 1934, obtained in Tokyo.—*W. A.*

3353. Sezawa, K., and Kanai, K., The rate of damping in seismic vibrations of a surface layer of varying density or elasticity: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 3, pp. 484–495, September 1935.

Theoretical discussion of the method of damping the vibrations in a layer with varying density or elasticity. Although the method of damping differs greatly according to the distribution of densities or elastic constants in both the layer and the subjacent medium, the authors conclude that the damping is due mainly to the dissipation of vibrational energy into the subjacent medium and very little to other causes, such as internal friction in the ground.—*W. A.*

3354. Sezawa, K., and Kanai, K., Decay in the seismic vibrations of a simple or tail structure by dissipation of their energy into the ground: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 3, pp. 681–697, 1935.

The main reason for comparatively small damages to structures during earthquakes is investigated and is explained by the dissipation of vibrational energy in the form of seismic waves transmitted into the ground. A theoretical discussion of the decay of vertical, shearing, and flexual vibrations in a simple and in a tall framed structure is given.—*W. A.*

3355. Sezawa, K., and Kanai, K., Energy dissipation in seismic vibrations of a framed structure: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 3, pp. 698–714, 1935.

In their previous studies of the problem of energy dissipation in seismic vibrations of structures the authors assumed that the movement of the lower end of the foundation of the structure is the same as that of a free ground surface. Owing to the fact, however, that a structure and the ground have essentially different elastic properties and that a great part of the earthquake energy below the structure is reflected back into the ground, the authors revise their previous work and, on the basis of new calculations, conclude that owing to the dissipation of vibrational energy into the ground, the amplitudes of vibrations of the structure do not exceed a certain limit. The mathematical discussion of the problem is given.—*W. A.*

3356. Sezawa, Katsutada, and Kanai, Kiyoshi, The nature of microseisms of local type: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 4, pp. 729–739, December 1935.

Several microseisms are discussed mathematically, and from the comparison of them it seems now established that microseismic vibrations of local type are formed mainly by selective forced vibrations of the surface layers due to the pulsation in air pressure on the surface of the earth, and also that the rigidities of the underlying strata are not very large compared with those of the upper layers.—*W. A.*

3357. Sezawa, Katsutada, and Kanai, Kiyoshi, The effect of sharpness of discontinuities on the transmission and reflection of elastic waves: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 4, pp. 750–756, December 1935.

The theory of reflection and refraction of waves at discontinuities within an elastic body as studied by Knott and developed by Kawasumi and Suzuki involved very sharp changes of density or elasticity. But according to the authors, the conditions thus assumed could hardly exist in reality, the probability being rather that the distribution of material in the immediate vicinity of the discontinuities in the earth would vary more or less gradually, the amplitudes of transmitted (refracted) and reflected waves through these discontinuities differing somewhat with difference in the lengths of the incident waves.

Knott's values agree well when the wave length is large compared with the thickness of the intermediate layer. However, for shorter waves the amplitudes of transmitted waves generally take greater values and those of reflected waves smaller values than those given by Knott, but for a certain intermediate range of thickness the respective amplitudes differ greatly as the wave length alters.—*W. A.*

3358. Sezawa, Katsutada, and Kanai, Kiyoshi, Elastic waves formed by local stress changes of different rapidities: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 14, no. 1, pp. 10–17, March 1936.

In a previous paper (Sezawa, K., Elastic waves produced by applying statical force to a body or by releasing it from a body: Earthquake Research Inst. Bull., vol. 13, pp. 729–739, 1935) it was shown that if a stress is applied to a body or released from it, the energy transmitted to infinity depends on the rapidity with which the stress is applied or released.

In this article the authors discuss the question whether the energy transmission due to the release of the stress at a certain rapidity would be equal to that due to the application of the same stress—the question raised in view of the prevalent idea that the large energy of some earthquakes is due to sudden release of the strain energy that was stored in the focal region. Mathematical calculations are given under the following items: (1) Criteria of positive and negative change in local stress; (2) elastic waves formed by local stress changes of different rapidities, and (3) remarks on compressional and refractional waves.—*W. A.*

3359. Sezawa, K., and Kanai, K., The nature of transverse waves transmitted through a discontinuity layer: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 14, no. 2, pp. 157–163, June 1936.

Deal with the problem of oblique incidence for transverse waves with displacements oriented parallel to the plane of the discontinuity layer. A mathemetical discussion is given.—*W. A.*

3360. Sezawa, K., and Kanai, K., Improved theory of energy dissipation in seismic vibrations of a structure: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 14, no. 2, pp. 164–188, June 1936.

In several previous papers the authors discussed this problem under some assumptions facilitating the solution. In this paper a theoretical discussion of the more complex problem is given for the following cases:

1. A simplest structure subjected to incident longitudinal waves.
2. A tall structure with rigid floors subjected to incident transverse waves.
3. A tall structure with flexible floors subjected to incident transverse waves.
4. General theory for a framed structure.
5. A structure with rigid floors and clamped base.
6. A structure with flexible floors and clamped base.
7. A structure with rigid floors and hinged base.
8. A four-storied structure with rigid floors and clamped base.
9. A five-storied structure with rigid floors and clamped base.
10. A six-storied structure with rigid floors and clamped base.
11. General law and comparison of the results of the present as well as the original problems.—*W. A.*

3361. Sezawa, K., and Kanai, K., Energy dissipation in seismic vibrations of a seven-storied structure; Nature of co-resonance: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 14, no. 2, pp. 189–200, June 1936.

The authors discuss energy dissipation in seismic vibration with respect to the case of a seven-storied framed structure. (See abstract 3360.) Mathematical formulas are determined; they correspond to the authors' original as well as improved theories.—*W. A.*

3362. Sezawa, Katsutada, On the relation between seismic origins and radiated waves: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 14, no. 2, pp. 149–156, June 1936.

A mathematical discussion showing that the mechanism of seismic origin is probably of the nature of plastic deformation as the result of a relatively sudden movement and mainly of shearing type. The radiated waves would then be mainly distortional. In the usual earthquakes of relatively shallow origins, transverse waves are predominant rather than the longitudinal. My result seems then to be more in line with Jeffreys' particular conclusion that P waves are merely generated from S waves by reflection at discontinuity surfaces than with other theories.—*Author's conclusion.*

3363. Sokolov, P. T., Über einige Eigenschaften der Laufzeitfunktion [On some properties of travel-time function]: Gerlands Beitr. Geophysik, vol. 47, no. 3, pp. 276–289, Leipzig, 1936.

The author supposes that the velocity of elastic waves in the earth is a function of a radius vector. On the condition that the trajectories of seismic waves have only one minimum for the radius vector and the assumption that the focus of an earthquake is on the earth's surface, a formula for the epicentral distance is derived. The hodograph is worked out and its properties examined.—*W. A.*

3364. Stockman, L. P., Twenty-three crews making seismograph surveys in California: Oil and Gas Jour., vol. 35, no. 12, p. 11, Tulsa, Okla., 1936.

The increase of geophysical exploration for new fields in California is mentioned. Most of the crews are working in the San Joaquin Basin, especially that area in Kern County between the recently discovered Stevens field and Buttonwillow gas field. The reflection method is used.—*W. A.*

3365. Syono, S., Free motion on the surface of a semi-infinite elastic solid: Geophys. Mag., vol. 9, pp. 285–298, Tokyo, December 1935.

In Lamb's treatment of this problem he assumed a concentrated force. This is shown to lead to untenable results in certain circumstances. The free motion of a surface is here worked out without adopting the assumption of a concentrated distribution.—*W. A. R., Sci. Abstracts, vol. 39, no. 461, 1936.*

3366. Terada, Torahiko, Colloids and seismology: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 3, pp. 562–567, September 1935.

Note to draw the attention of seismologists, especially those interested in the secular movement of the earth's crust, to the colloidal properties of some crust materials, as these properties seem not to have been duly taken into account, in spite of their probable importance in connection with many urgent problems of modern seismology.—*W. A.*

3367. von Thyssen, St., Über die Verwendung verschiedenartiger Explosionen zur Erregung seismischer Wellen [On the application of different kinds of explosions for exciting seismic waves]: Zeitschr. Geophysik, vol. 12, no. 2/3, pp. 86–97, Braunschweig, 1936.

The author discusses in the first part important technical viewpoints concerning explosions applied in practical explosion seismics. Then experiments for producing elastic waves by means of the accumulated energy of compressed gases and by driving mechanism enclosed in steel tubes are discussed. The "degree of the seismic effect" of explosives is small if the explosive power of explosives is transferred into seismic energy. Finally, it is shown that the explosion of comparatively small amounts of black powder enclosed in steel tubes is sufficient to produce useful reflection seismograms.—*Author's abstract, translated by W. A.*

3368. Trappe, Fr., Neuere Anwendungen des seismischen Verfahrens der Lagerstättenforschung [Recent applications of the seismic method of prospecting for deposits]: Öl und Kohle, vol. 12, no. 18, pp. 384–387, Berlin, 1936.

Exploration with refracted seismic waves prevailed during the first 10 years of field practice of the seismic method of subsurface exploration founded by L. Mintrop. This was due to the fact that the finding of new structures was the first problem given to the petroleum geophysicist. The detailing of the structures found was of secondary importance during this period.

Seismic reflection surveys are now extensively used to determine the depth to the surface of the coal beds in German coal districts. Postcoal faults are traced, and horsts are outlined in detail. Flank investigations on salt domes of the mushroom type are also carried out with reflected waves. Reflected waves penetrate much deeper than refracted waves.

Emphasis is laid on the importance of seismograph records in deep bore holes in order to obtain accurate average velocities.

On April 1, 1936, the following field parties were at work in Germany: 6 seismograph parties, 1 seismic foundation soil research party, at least 12 torsion-balance parties, and 4 gravimeter parties.—*Author's abstract, translated by W. A.*

3369. Visser, S. W., Some remarks on the deep-focus earthquakes in the International Seismological Summary: Gerlands Beitr. Geophysik, vol. 47, no. 3, pp. 321–332, Leipzig, 1936.

1. *The normal depth.*—There is no indication that Turner's normal depth of 0.04 R (225 kilometers) should be reliable.

2. *The long-wave records.*—The general reliability of Turner's depth determinations is confirmed by the long-wave records in the I. S. S. Great errors, however, occur. The L–N criterion (L, number of genuine long-wave records; N, the number of no long-wave records) may serve as a means of deducing the focal depth up to a limit of 0.09 R.

3. *The mystery of the high focus.*—The high-focus earthquakes are always shallow earthquakes.

4. *The geographical distribution.*—A group of 129 bathyseisms has been selected. The deepest earthquakes are found in well-defined areas, especially at the continental side of the shallow earthquake zones of the circum-Pacific belt. The focal depth increases continent-inward.

5. *The semiannual period.*—The 129 selected cases do not show this period; on the contrary they reveal a well-developed annual oscillation, especially in the Northern Hemisphere. This period suggests a strong interaction between the Asiatic continent and the Pacific Ocean.—*Author's summary.*

3370. Wanner, E., Comparaison d'enregistrements sismométriques obtenus par différents appareils [Comparison of seismometric records obtained by different apparatus]: Archives sci. phys. et nat., vol. 18, pp. 53–54, Geneva, January–February 1936.

Seismographs constructed according to Mainka and Quervin Piccard are compared. Too high values for the true oscillations of the ground are recorded by Mainka's seismograph for times of oscillation less than 4 seconds. The proper frequency of the transformation lever in this seismograph is determined to be the source of the error.—*W. A.*

3371. Westland, A. J., Comparison of old and new methods in analysis of earthquake of September 9, 1931: Seismol. Soc. America Bull., vol. 26, no. 2, pp. 119–124, April 1936.

The reason for the inability to determine satisfactorily the epicenter of certain earthquakes is traced to their foci being at abnormal depths. Such earthquakes are characterized by the insignificance or absence of surface waves, and the appearance of certain new phases—for example, pP, sP, and sS. Application in such cases of the Brunner depth chart gives a satisfactory solution for the epicenter. This is illustrated by comparing this method with that resulting from the use of normal tables of 1931 to the earthquake of September 9, 1931, at 18° N., 145.5° E.—*C. A. S., Sci. Abstracts, vol. 39, no. 465 1936.*

3372. Yamaguti, Seiti, A model experiment on the mechanism of occurrence of earthquakes: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 13, no. 4, pp. 772–782, 1935.

Describes an experiment which confirms the suggestion of Professor Terada that if a spherical part of the crust at the "deep" earthquake origin, lying several hundred kilometers beneath the earth's surface, happens to expand or yield by some cause, the maximum shearing stress may occur in a conical surface with semivertical angle of about 45° and the vertex at the center of the sphere, and the fracture may propagate along these directions toward the earth's surface.—*W. A.*

3373. v. zur Mühlen, W., Seismische Bodenruhe und Brandung [Seismic disturbance of the ground and the surf]: Zeitschr. Geophysik, vol. 12, no. 2/3, pp. 97–111, Braunschweig, 1936.

The correlation coefficients between the seismic disturbance of the ground in Hamburg, Potsdam, Taunus Observatory, Stuttgart, Strassburg, and Kerr, on the one hand, and the surf in northern and western Europe, on the other hand, are examined for two periods of time during the years 1930 and 1932. The discussion is carried on in consideration of the mutual relationship of the intensity of the surfs, the magnitude of their variations, and possible connection to the course of the primitive rocks, the latter viewpoint being raised by Schwinner. After a brief discussion of other possible explanations of the disturbance of the ground, the author finally examines the diurnal positions of the cyclones in northern Europe during the days of the maxima and minima of the disturbance of the ground for the two periods mentioned. These positions of the cyclones are shown in two maps.—*Author's abstract, translated by W. A.*

4. ELECTRICAL METHODS

3374. Bayard-Duclaux, Mrs. F., Recherches sur la conductibilité électrique des roches [Investigations on the electrical conductivity of rocks]: Annales de physique, vol. 6, pp. 5–107, Paris, July–August 1936.

The electrical conductivity of rocks is connected with a great number of other special questions, such as resistivity of minerals and factors that may influence the conductivity. Owing to the fact that knowledge concerning rocks in general is still very incomplete, the purpose of this article is to give a summary of a systematic investigation on rocks made by the author and to compare their electrical properties with those of the bodies adjoining them. The rocks selected are of very different origin.—*W. A.*

3375. Belluigi, A., Sui metodi interpretativi delle curve ρs per piu strati paralleli sovrapposti [On the methods of interpreting the ρs curve for several superposed parallel layers]: Beitr. Geophysik, vol. 6, no. 1, pp. 14–24, Leipzig, 1936.

The author discusses the empiric rules of interpreting the ρs curves and indicates the possible error even in the simple case of two layers. He draws the curve of the turning points (Wendepunkte) of Hummel's curve group $\left(\rho s\cdot\frac{a}{h}\right)$. The author considers the component method the most suitable one for interpreting the ρs curves. He confirms the validity of Tagg's method for the case of two layers but he proves, from examples, the inapplicability of this method for several layers. Finally, he gives an example of the application of the component method in the alluvial region of the Paduan Valley.—*Author's abstract, translated by W. A.*

3376. Belluigi, A., Theoretical outlines of electrical coring: Beitr. angew. Geophysik, vol. 6, no. 1, pp. 25–37, Leipzig, 1936.

By this paper the author completes the series of his studies on electrical coring, three of which appeared last year in the "Bolletino del Comitato per la geodesia e la geofisica del Consiglio nazionale delle ricerche." Theoretical course of the drop of tension for some fundamental causes along the uncased part of a bore hole is established with regard to the method of measurement. Favorable conditions for measurements in determining the anomalies are mentioned, and the rules to be applied for the exact location of the physico-geological "discontinuities" (oil-bearing layers and ground-water horizons) are given. These "discontinuities" are not always in simple spatial relation with the electrical anomalies. This fact has been noticed several times in petroleum fields and can be derived directly from the theory.—*Author's abstract.*

3377. Brown, J. G., The effect of wind upon the earth's electric field at the surface: Terrestrial Magnetism and Atmospheric Electricity, vol. 41, no. 3, pp. 279–285, Baltimore, September 1936.

In a recent paper by Brown (see Geophys. Abstracts 83, p. 1772) a method of obtaining the local diurnal variation by eliminating the unitary variation from mean curves was adopted, and a theory of the local variation based upon the daily cycle of turbulence, convection, and subsidence in the atmosphere was proposed. C. W. Allen's observation (Commonwealth Observatory Mem. 4, May 1934) that on days of continuous wind the diurnal variation of the gradient at Mount Stromlo, Australia, approaches the unitary or world variations observed over the oceans, whereas on calm days the departure from the variations over the ocean is much greater, is of considerable interest in connection with this theory.

The mean local variations of the days of continuous wind and the calm days at Mount Stromlo have been computed, and the results are shown in a graph, along with the local variation computed from all electrically quiet days. From these curves it is evident that wind is an important factor in determining the amplitude and form of the local variation.

A series of examinations of gradient and meteorologic records for the detailed study of the effect of wind is given.—*W. A.*

3378. Collard, J., A search coil method of measuring the A. C. resistivity of the earth: Inst. Electrical Engineers Jour., vol. 78, no. 469, pp. 100–104, January 1936.

A description of the method of measuring the A. C. resistivity of the earth on the Carson-Pollaczeh theory for the mutual impedance of earth return circuits. The method consists in the measurement of the e. m. f. induced in a search coil at various distances from an earth return circuit carrying alternating current. The experimental points are superimposed on a set of theoretical curves calculated for different values of resistivity, and the curve with which the points coincide gives the resistivity.

The method has been used to measure the resistivity of the earth at various sites in England and Italy.

The results are given in table 1, showing the resistivity in ohm-cm and the geological formation at each site, and table 2 gives the resistivity in ohm-cm of the various geological formations, varying from a minimum for alluvium of 200–400 ohm-cm to a maximum for igneous rocks of 50,000–100,000 ohm-cm.—*B. F. N. M., Inst. Petroleum Technologists Jour., vol. 22, no. 151, 1936.*

3379. Coulomb, J., La mesure du champ électrique au sommet du Puy de Dôme [Measurement of electric field at the summit of the Puy de Dôme]: Inst. et obs. de physique de globe du Puy de Dôme Bull., vol. 8, 12 pp., 1935–36.

Describes the installation for measuring the electric field at the summit of the Puy de Dôme adapted to the local meteorologic conditions. The results obtained in 1934 are shown in graphs and a table.—*W. A.*

3380. Dmitriev, V. L., and Tolmachev, B. V., Tests of electrical prospecting for underground waters [in Russian]: Materialy po gidrogeologii i inzhenernoi geologii U. S. S. R., no. 1, pp. 99–104, Tashkent, 1935.

After a brief outline of the method of electrical prospecting and its application in hydrogeology the authors give a description of their work in the region of Kokand (Central Asia) in 1933.

A series of investigations by using point electrodes 3 to 600 meters apart was made. From the data obtained a map of resistance curves was drawn. The chemical composition of the ground waters is shown in another map.

The authors conclude that although no definite technical and economic data could be obtained by the method used, its application may be useful for some preliminary prospecting to depths from 30 to 100 meters.—*W. A.*

3381. Dolitsky, V. A., Electrical coring in the Kaganovich mine [in Russian]: Neftianoe khoziaistvo, vol. 17, no. 4, pp. 34–43, Moscow, April 1936.

From a series of diagrams produced by the results of electrical corings in the bore holes of the Kaganovich mine, the author traces the various layers and determines the changes in the resistance of these layers. By analyzing these resistances the author establishes some regularities and draws conclusions on the irregular saturation of the various parts of oil zones, thus raising the question of separate exploitation of these parts.—*W. A.*

3382. Fritsch, Volker, Mitteilungen über die Versuche bei Ostrov und Macochy (Prüfung der funkgeologischen Ergebnisse durch Schürfungen) [Information concerning the tests made near Ostrov and Macochy (Verification of radio-geological results by boring)]: Hochfrequenztechnik und Elektroakustik, vol. 46, no. 6, pp. 186–187, Leipzig, 1935.

The radio-geological results of the application of the capacity method near Ostrov and Macochy were verified by boring. It was proved that the Fochdome had a continuation in the eastern direction and was filled with clay and that at farther distances there were also empty cavities.—*W. A.*

3383. Fritsch, Volker, Dritte Mitteilung über die Bergradioversuche in Kotterbach [Third communication on the radio tests in mines in Kotterbach]: Hochfrequenztechnik und Elektroakustik, vol. 47, no. 6, pp. 190–195, Leipzig, June 1936. (See Geophys. Abstracts 83.)

Describes tests of receiving and tests of sending. The following results of practical importance were obtained:

(*a*) Indication of the existence of good geologic conductors, such as water channels or faults of great dimensions, is possible by the absorption method on a 25-meter strip.

(*b*) The radio in mines (Grubenfunk) on a 25-meter strip is, in case of small energies, possible only over short distances.

(*c*) The course of the absorption curve and especially the frequencies of the extreme absorptions depend on the electrical properties of the volume of rock penetrated, the latter being supposed as structures consisting of first- and second-order conductors with dielectric zones embedded in them. They can be explained by Debye's and Falkenhagen's theories. From the position of the absorption strip (Absorptionstreifen), which depends on the losses caused by conduction and dielectric bodies and can be determined by measurement, it is possible to draw conclusions on the composition of the space in question—for example, the existence of lodes. Thus a new method of radio prospecting could be created by which, under certain circumstances, more reliable data could be obtained than by the absolute measurements of the decrease of the intensity of field used at the present time.—*Author's abstract, translated by W. A.*

3384. Fritsch, V., Einige Grundzüge der Funkengeologie [Some characteristic features of spark geology]: Elektrotech. Zeitschr., vol. 57, no. 30, pp. 857–861, Berlin, 1936.

Radio-geologic work and its practical application in mining are described briefly. The possibility of geologic exploration by radio-technical measurements according to the principles of the absorption method and the capacity method is examined. Finally, the author discusses the principles for applying radio in mines (Grubenfunk) when wire communication of the underground with the surface of the earth is destroyed by a disaster.—*Author's abstract, translated by W. A.*

3385. Fritsch, Volker, Beitrag zur Anwendung der Funkmutung nach dem Absorptionsverfahren [Contribution to the application of spark prospecting (radio prospecting) according to the absorption method]: Elektrotech. Zeitschr., vol. 57, no. 42, pp. 1204–1205, Berlin, 1936.

By a method of spark prospecting (prospecting by radio) are drawn conclusions on the condition and composition of the mountain mass under investigation from the relation of frequency to the coefficient of extinction. This method, if compared with the usual absorption method, offers certain advantages. The author refers to his previous articles published in Elektrotech. Zeitschr., vol. 57, no. 30, p. 857, 1936, and Hochfrequenztechnik, vol. 47, p. 190, 1936. [See abstracts 3383 and 3384.]—*Author's abstract, translated by W. A.*

3386. Fritsch, Volker, Beiträge zu den Beziehungen zwischen Ausbreitung Hertzscher Wellen und geologischer Beschaffenheit des Untergrundes (Funkengeologie); Grundlage und Anwendung der Kapazitätsmethode [Contribution to the relationship between the propagation of Hertzian waves and geological structure of underground (radio geology); principles and application of the capacity method]: Beitr. angew. Geophysik, vol. 5, no. 4, pp. 375–395, Leipzig, 1936.

Discusses the principles of the "capacity method" and its application to geophysical exploration of the subsoil. First, he determines the electrical oscillatory circuit and especially the favorable ratio of firmly fixed capacities and self-induction. Then, a substitute for the geologic conductor under consideration is developed, and the conditions for making the necessary assumptions are investigated. From these considerations the minimum wave length and the length of the antenna are determined. Geologic conductors as a rule do not represent surfaces of separation well distinguished electrically; therefore a fictitious conductor is chosen instead, the vertical distance of which from the surface of the ground is called the "fictitious depth." The author examines a series of simple cases involving one or several geologic media. The influence of the resistance loss upon the result of measurement is especially discussed. The two most important methods are examined at the end of the general part of the article. In the curve method the substitute capacity of the antenna C_a is represented as a function of the height of the antenna h_a above the ground, and from the course of the curve conclusions on the kind and composition of the subsoil are drawn. By using the other method the substitute capacity is determined from a great number of stations on the area of examination; then the points of equal substitute capacity are connected with one another by curves (C constants), and from their courses conclusions on their properties are drawn.

In the second part of the article (which will appear in a later issue) the author discusses the results of his experiments in the Moravian karst, near Brünn, and the Kotterbach sparry iron ore deposits, in Slovakia. The method was applied there above cavities and outcrop fissures, as well as in drifts. Its capability of reproduction and applicability for prospecting for the height is discussed, and a great number of typical C_a/h_a curves and C constants are presented.—*Author's abstract, translated by W. A.*

3387. Fritsch, Volker, Beiträge zur den Beziehungen zwischen Ausbreitung Herz'scher Wellen und geologischen Beschaffenheit des Untergrundes (Funkgeologie); Grundlagen und Anwendung der Kapazitäts Methode [Contribution to the relationship between the propagation of Hertzian waves and geologic structure of underground (radio geology); principles and application of the capacity method]: Beitr. angew. Geophysik, vol. 6, no. 1, pp. 100–119, Leipzig, 1936.

Continuation of a paper published in the Beiträge, volume 5, no. 4, 1936. (See abstract 3386.) This paper describes tests made by the author in Kotterbach and in Ostrov and Macochy, and problems of future investigations.

The author attempts to analyze some principles of the capacity method and to stimulate new measurements based on his own tests. This work cannot be considered as being accomplished, but in making further investigations with some new viewpoints a perfect method may be developed. Although theoretical foundations allow us to develop a suitable method, practical results can be attained by this method only after sufficient experiment.—*Author's abstract, translated by W. A.*

3388. Gish, O. H., Electrical messages from the earth; reception and interpretation: Washington Acad. Sci. Jour., vol. 26, no. 7, pp. 267–289, July 15, 1936.

The view may be tentatively entertained that earth currents are in the main induced by magnetic variations, but that their strength and duration depend upon the distribution and configuration of oceans and continents, as well as upon other structural features of the earth. Modifications produced in earth currents by the deep structure of the earth's crust may thus afford information about conditions in that little-known region. The magnetic forces which, on the view just outlined, influence the earth currents have their immediate origin in the high atmosphere in about the same region which reflects radio waves. One might expect to find in the earth a general system of electrical calculations related to that in the higher atmosphere. It has recently become possible to construct, on the basis of observed data, a world picture of earth currents. A world view is summarized of the gross aspects of the quiet-period earth currents, comprehensively interpreting the tranquil electric messages from the earth.—*J. E. B., Sci. Abstracts, vol. 39, no. 466, 1936.*

3389. Hummel, J. N., and Rülke, O., Der scheinbare spezifische Widerstand in Bohrlöchern [The apparent specific resistance in bore holes]: Beitr. angew. Geophysik, vol. 6, no. 1, pp. 89–99, Leipzig, 1936.

In a vertical section of a group of strata with a constant measuring basis the apparent specific resistance ascertained by means of the Neumann-Wenner four-point method generally gives bizarre curves which are in no simple proportion to the actual specific resistances of the single layers. The apparent specific resistance is by no means an average value resulting from the actual resistances, it is even not always enclosed in their range, but the extreme values of the apparent specific resistance may be greater or less than the maximum or minimum actual specific resistances of the respective layers. If three base points are used the curves show an amount of edges which is three times that of layer limits crossed by the measuring base. Several special cases are dealt with, the values calculated being made up in the form of a diagram. Calculations of this kind are most important for utilizing the results of measurements obtained from electric bore-hole investigations.—*Authors' abstract.*

3390. Jakosky, J. J., and Wilson, C. H., Electrical mapping of oil structures: Mining and Metallurgy, vol. 17, no. 353, pp. 231-237, 1936.

Two years of intensive application of the electrical method described in this paper has given ample opportunity to evaluate its effectiveness. This work shows the method to be applicable under fairly wide geologic conditions, but to be limited to problems where the depths of penetration are less than 3,500 to 4,000 feet. The extreme detail obtained in normal field operation, with readings made at depth intervals of 15 to 20 feet, minimizes the possibility of errors in interpretation in areas of complicated stratigraphy. This method differs from previous electrical methods in maintaining an accuracy of measurement and interpretation consistent with the small changes in value introduced by the deeper subsurface stratigraphic changes, largely because of (1) minimizing the variation in apparent resistivity with time of current flow, by means of a constant time of measurement; (2) eliminating the variation in apparent resistivity with density of current flow by means of a constant time of measurement; (3) eliminating the variation in apparent resistivity with density of current flow by systematically increasing the total current flowing in the energizing circuit as the volume of earth increases with greater depths of penetration; (4) development of a graphic method of interpretation, based primarily on the depth-resistivity logs obtained from the surface measurements; and (5) multi-directional measurements, which allow evaluation of topographic and near-surface effects.

The method may be used as a supplement to other geophysical methods and, when operating as a constant-depth traverse system, may be employed as a rapid reconnaissance method for indicating structural changes and for the location of faults and fault zones.—*Authors' abstract.*

3391. Jakosky, J. J., and Wilson, C. H., Electrical mapping of oil structures: California Oil World, vol. 29, no. 2, pp. 2–3, 14–16, July 30, 1936; vol. 29, no. 3, pp. 14–15, Aug. 6, 1936.

The same paper was published also in Mining and Metallurgy, volume 17, no. 353, pages 231–237, 1936. (See abstract 3390.)

3392. Jensen, Joseph, Recent developments related to petroleum engineering: Oil and Gas Jour., vol. 35, no. 31, pp. 44, 48, Tulsa, Okla., 1936; Petroleum World, vol. 33, no. 434, pp. 298–300, London, 1936.

This paper was delivered before the Pacific coast meeting of the Petroleum division, American Institute of Mining and Metallurgical Engineers, Los Angeles, October 1–2, 1936.

A new method for logging formations through casing, known as the "stratagraph", is based upon the electromotive series of metals. Two circuits are established and nearly balanced against each other, the difference between the two making a record which is interpreted. Each of these circuits is so regulated with resistance that it has about the same strength as the other, their variations being affected by the fluid in the formation, which serves as an electrolyte. The first circuit includes a zinc rod driven in the ground about 150 feet from the well. The current flows from the zinc rod through the earth to the casing of the well and is returned to the zinc rod from the casing through a wire in which the recording instrument and the resistance are placed. The second circuit includes a zinc plate suspended on an insulated wire line inside the casing. The fluid in the casing may be oil-field water, fresh water, salt water, or mud, but of the same consistency. This creates a constant electrolytic action between the zinc plate and the casing. The current flows from the zinc to the casing and from the casing through the earth to a copper ground located about 100 feet from the well. It returns from the copper ground through the recording instrument and the resistance down the cable to the zinc plate. These two currents flow in opposite directions. The only purpose of introducing the resistance in one of the circuits is to limit the swing of the needle of the recording device to the width of the paper on which the record is made. As the suspended zinc plate is raised or lowered in the well and comes opposite the different beds outside the casing containing fluids of different strength, currents of different magnitudes are set up. Thus the record is made. Where the record swings widely to the left it indicates shale, and where it swings widely to the right it indicates sand. The attached sketches are submitted in support of the foregoing explanation of the two circuits.—*Author's description.*

3393. Jensen, Joseph, Recent developments related to petroleum engineering: Petroleum World, vol. 33, no. 434, pp. 298–300, London, 1936.

The original paper under this title was delivered before the Pacific coast meeting, Petroleum division of the American Institute of Mining and Metallurgical Engineers. (See abstract 3392.)

3394. Johnson, E. A., Application of alternating-current methods of detection to earth inductors for marine and land observations: Terrestrial Magnetism and Atmospheric Electricity, vol. 41, no. 3, pp. 251–260, Baltimore, 1936.

The limiting sensitivity of earth inductors is discussed from a theoretical and experimental point of view for the case of direct-current and alternating-current methods of detecting the output. The effect of parasitic voltages is discussed, and it is concluded that the alternating-current detector may be made as much as 1,000 times as sensitive as the direct-current detector. The particular advantage of alternating-current methods of detection for marine observations is pointed out, and it is shown that such observations can be made with greatly increased accuracy.—*Author's abstract.*

3395. Keeler, Ralph, Geophysical prospecting in the Philippines: Am. Chamber of Commerce Jour., vol. 16, no. 8, pp. 26–27, 29, Manila, August 1936.

Geophysical prospecting in the Philippines during the last 2 years by the Developments Co., Inc., is based on a high-frequency inductive method; an electro-magnetic field envelops the ground for a certain distance, and distortions or irregularities produced by the hidden mineral bodies are recorded and mapped. A small radio broadcasting station, of about 50-watt power, is used to set up the magnetic field, and a portable radio receiving set is set up combined with a direct finding coil for making readings. The distance over which the equipment is effective varies, but in the islands about 1,000 feet is the usual distance between broadcasting and receiving set. Mineral bodies can be located to a depth of several hundred feet. Properties on which the surveys were made are listed.—*W. A.*

3396. Khmelevsky, I. V., Application of electrical methods of prospecting for studying karst phenomena [in Russian]: Razvedka Nedr, no. 13, pp. 30–32, Moscow, 1936.

Electrical methods of prospecting were tried by the author over a well-known karst area in the region of Chapaevka village, Saratov district, in order to establish the influence of karst phenomena on the results of measurements and on the interpretation of the data obtained. A very irregular curve was obtained from the electrical sounding over caverns, probably owing to tufa deposits there; the curve could not be interpreted by the usual methods of interpretation. The existence of the caverns could be clearly determined from the data obtained by electrical profiling, as low resistances were shown here in comparison with the high resistances produced by the surrounding limestone. The contours of the caverns could be well established and agreed with the slight subsidence of the ground observed by the eye. The determination of the depth of the caverns offered difficulties and could be made only very approximately.—*W. A.*

3397. Kupradze, V., Verbreitung der elektromagnetischen Wellen in nichthomogenem Medium [Propagation of electromagnetic waves in a nonhomogeneous medium]: Acad. sci. U. R. S. S. Comptes rendus, new ser., vol. 1, no. 1, pp. 7–9, Leningrad, 1936.

A mathematical discussion of the distribution of the electromagnetic waves in a layered medium. The integral equations obtained for this medium may be easily modified for a medium that contains a series of independent layers, each enclosed in the previous one of the series.—*W. A.*

3398. Kurdiukov, V. A., and Ryng, S. I., Prospecting for buried valleys by electrical methods [in Russian]: Razvedka Nedr, no. 14, pp. 12–14, Moscow, 1936.

Favorable results of electrical prospecting for water were obtained in 1935 in the arid regions of Karaganda-Balkhash (Kirghiz Republic). The depths of the three uppermost layers were determined by electrical boring with an average error of a few meters. A bore hole was started at a place indicated by electrical prospecting, and water was found at a depth of 96 meters.—*W. A.*

3399. Lee, F. W., Geophysical prospecting for underground waters in desert areas: U. S. Bur. Mines Inf. Circ. 6899, 27 pp., August 1936.

A description of methods and results of geophysical prospecting for water in Nevada and adjacent States includes discussions of some of the associated problems relating to field technique and geologic interpretations, and some of the problems a field engineer encounters.

The author's conclusions may be summarized as follows:

Geophysical surveys in Nevada can help to determine underground water reserves. Enough water for moderate irrigation can be found in favorable districts. Sufficient differences exist in electrical conductivity between the gravel and clay beds to permit successful prospecting for water, especially at shallow depths. Where the water-bearing beds are as much as 350 feet deep, as in Bertine's artesian well, possible productive territory can be delineated. Considerable increase in speed of measurement and interpretation is possible with newer instruments. More experimental work relating to electrical conduction in the ground is desirable.

The paper is illustrated by 25 figures.—*W. A.*

3400. Loehnberg, A., and Loewenstein, A., Electrical prospecting for water: Mining Mag., vol. 55, no. 3, pp. 143–153, London, 1936.

In an account of geoelectrical work in Palestine involving boring operations for water a discussion of the general principles of geoelectric measurements and hydrologic underground prospecting is given. In the literature heretofore the questions treated were almost exclusively confined to the discovery of the first water horizon. There was rarely a discussion as to the quantity of water obtainable. To fill this gap the authors touch on the problem of water exploration in its general and most usual form, as follows:

1. All water-bearing strata are to be localized to a depth within economic limits.
2. The subterranean drainage area for the various water horizons is to be established and the yield of water to be estimated.
3. The probable quality of the subsoil water is to be found out.
4. Indications are desirable as to the difficulties encountered in the process of boring—that is, data as to the material of the various strata.

Before quoting examples illustrating a solution to these problems the authors discuss the obstacles that stand in the way of a hydrologic evaluation of geoelectric results.

Field diagrams of areas in which measurements were made are given, and their evaluation is discussed. The average measuring depth was 200 meters (minimum 50 meters, maximum 600 meters). The proportion of successful borings to the total number made with the aid of electrical methods is 85 percent. Without geoelectrical measurements the proportion of successful borings is estimated at not more than 30 to 40 percent.

3401. Loehnberg, A., and Loewenstein, A., Die geoelektrische Hydrologie als Teilgebiet der Analyse des Untergrundes [Geoelectric hydrology as a special field in analyzing the underground]: Beitr. angew. Geophysik, vol. 6, no. 1, pp. 52–88, Leipzig, 1936.

For the solution of practical hydrologic problems (discovery of underground water), in addition to the first underground-water horizons, the deeper water resources must also be detected. The static and dynamic conditions of the area to be investigated must be determined. To solve these questions the structure of the underground strata must be known in detail. This is possible by a new method of interpreting the curves of the apparent specific resistance (drawn according to Wenner); this method represents a modification and extension of Hummel's method by using flexible curves (Schmiegungskurven). The application of this method is described, and references justifying it are given. These interpretations, given in the form of vertical profiles beneath the points of measurement, result in cross sections of the underground showing the actual structure. From these pictures of the underground as developed by the geoelectric survey, conclusions on the hydrologic conditions may be drawn.

The necessary transformation of the results of geoelectric measurements into hydrologic or geologic facts requires a special complex kind of work.

Examples of geoelectric-hydrologic work in Palestine are described, and their practical results in connection with the discovery of water are mentioned.—*Authors' abstract, translated by W. A.*

3402. Löwy, H., Die Fizeaumethode und damit zusammenhängende Probleme der Geophysik und Hochfrequenztechnik [The Fizeau method and problems of geophysics and high-frequency technique connected with it]: Beitr. angew. Geophysik, vol. 6, no. 1, pp. 47–51, Leipzig, 1936.

In the Fizeau method intermittent waves are emitted from an antenna and, after reflection from a conducting surface, are received again by the same antenna at periodical intervals; after this they are transferred to an intermitting receiver having the same period but opposite phase. This method for measuring the distance of electrically conductive surfaces and connected geophysical and high-frequency problems are discussed.—*W. A.*

3403. Nippoldt, A., The secret of earth currents: Terrestrial Magnetism and Atmospheric Electricity, vol. 41, no. 3, pp. 261–263, Baltimore, 1936.

Observations on American telegraph lines and at individual stations during the last polar year, those made by Stenquist, by the Carnegie Institution of Washington at Huancayo and at Watheroo, by the Jesuits at Tortosa, Spain, and by many others lead to the inevitable impression that earth currents are primarily a local phenomenon but in addition have a universal character.

The distribution of land and water exerts an essential influence on the whole system of superficial currents, inasmuch as sea water is a much better conductor than land masses. The attention of geophysicists is directed to the geophysical aspect of earth-current curves and the distinction between superficial earth currents and those induced by the magnetic variation.—*W. A.*

3404. Earth-resistivity method of geophysical surveying [editorial note]: Petroleum Times, vol. 36, no. 916, pp. 151–152, London, Aug. 1, 1936.

Describes a method of geophysical surveying with the Megger earth tester based on measurements of the electrical resistivity or specific resistance of the earth. From variations in the resistivity it is possible to make accurate deductions as to the nature of the subsoil. The method is particularly applicable to such problems as determining the depth to bedrock for dams, buildings, highways, etc. The equipment, illustrated in two photographs, consists of two parts, one containing the hand generator and the other the necessary measuring instruments, connection between the two being made by a special cable. There are five ranges—0–0.3, 0–1.0, 0–3.0, 0–10.0, and 0–30.0 ohms—and under normal conditions the instrument can be used for the determination of depths as great as 1,500 feet approximately.—*W. A.*

3405. Semenov, A. S., Method of electrical prospecting for hydraulic plants [in Russian]: Central Geol. and Prospecting Inst. Trans., no. 78, 64 pp., Leningrad, 1936.

A detailed description of field work by electrical prospecting in connection with the construction of large hydroelectric power stations. Conditions of the work in summer are examined especially. Experiments were made in tanks with the purpose of testing the effects of different factors on the character of the curves. A brief description of the method of interpreting the results is given. The article is illustrated by 47 figures.—*W. A.*

3406. Sen-Gupta, Bimalendu, and Khastgir, S. R., Direct determination of the electrical constants of soil at radio frequency: Philos. Mag., vol. 22, no. 146, pp. 265–273, London, August 1936.

The electrical conductivity σ and the dielectric constant ϵ of three different specimens of Dacca soil were directly determined by a resonance method for various values of moisture content from 0 to 40 percent, and for varying frequencies from 0.135×10^6 to 2.72×10^6 cycles a second. The values of σ and ϵ for the specimen of soil taken from a depth of 20 feet were decidedly lower than those for the surface soil Both σ and ϵ were found to increase with the moisture content, each tending toward a constant value for large values of the moisture content. The variation of σ and ϵ with frequency was also considerable.

Smith-Rose's direct determinations of σ and ϵ with specimens of English soil gave distinctly larger values, whereas Ratcliffe and White's values were of the same order as those obtained by us.

The values of the electrical constants of the soil obtained by direct experiments agreed in their order of magnitude with the values deduced from the attenuation measurements.—*Authors' summary and conclusion.*

3407. Geophysical prospecting for water [editorial note]: South African Min. and Eng. Jour., vol. 47, no. 2276, p. 44, Johannesburg, Sept. 12, 1936.

The striking success of the application of geophysical methods of prospecting for water (electrical methods) is mentioned in the annual report of the chief irrigation engineer for 1935. Drilling machines yielded the following results: With old-fashioned methods 29 bore holes were sunk, the footage drilled being 3,304; the total cost £4,147; the number of successful bore holes, 5; the percentage of successful holes about 17, and the average cost per useful supply over £800. On sites indicated as suitable after geophysical prospecting, 14 bore holes were sunk. The footage drilled was 2,412, at a total cost of £2,520, and the number of successful bore holes was 10. The percentage of successful bore holes was over 70, and the cost per useful supply £252.—*W. A.*

3408. Stefanescu, S. S., Sur les déformations d'un champ électromagnétique inductif provoquées par un sous-sol à stratification horizontale [On the deformations of an inductive electromagnetic field caused by the subsoil of horizontal stratification]: Soc. roumanienne phys. Bull., vol. 36, no. 63/64, pp. 169–179, 1934.

The electromagnetic field above the part of the earth's surface on which a straight-line current is induced is calculated. In one case the ground is considered to consist of several homogeneous isotropic layers, and in another case of several layers of good conductivity, which are embedded in a nonconductive medium.—*Landhoff's abstract published in Zeitschr. Geophysik, vol. 12, no. 4, p. 100, 1936, translated by W. A.*

3409. Stepanov, G. I., On the question of the application of geophysical methods of prospecting in investigations connected with engineering and geology [in Russian]: Razvedka Nedr, no. 17, pp. 38–39, Moscow, 1936.

Briefly discusses the necessity for geophysical methods, in particular the electrical method, in connection with engineering work. The following questions are selected:

1. The elements of the flow of underground water (its amount, coefficient of filtration, velocity, and direction).
2. Phenomena of cracks and their intensity with depth and determinations of waterproof zones.
3. Determination of the magnitude of the weathered zones and of the depth of rocks unaffected by weather.

A few examples of this work carried out in Russia with good results are mentioned.—*W. A.*

3410. Stevenson, A. F., On the theoretical determination of earth resistance from surface potential measurements: Philos. Mag., vol. 21, no. 142, pp. 829–830, London, 1936.

This is a correction to Stevenson's paper of the same title published in Philos. Mag., vol. 19, no. 125, pp. 297–306, 1935. (See Geophys. Abstracts 73.) It reads as follows: "In a recent paper I attempted to give a solution of the problem (in the case where the conductivity is a function of depth only) in terms of Fourier series. Prof. R. E. Langer has, however, communicated to me a criticism of the paper which unfortunately invalidates much of the work."

The reason is briefly as follows: Equations (9) of the paper are an infinite set of linear equations for determining the Fourier coefficients of the potential from those of the conductivity. Groups of these equations were then summed in a certain way in order to obtain a direct relation between the Fourier coefficients of the surface potential and of the conductivity. But by a closer consideration of the structure of the original differential equation, Langer has shown that this process of summation leads merely to a series of identities 0 equals 0, and that, consequently, the subsequent work can have no real significance. The equations (9) still hold for the determination of the potential when the conductivity is an assigned Fourier series (and might be of a certain use in this connection), but this does not, of course, solve the converse problem of determining conductivity from surface potential, and this was the main object of the paper.—*Author.*

3411. Tagg, G. F., Earth-resistivity curves: Mining Mag., vol. 55, no. 1, pp. 28–31, London, 1936.

The empirical interpretation of earth-resistivity curves can be expected to give satisfactory results if the disturbing bed is thin and is of a resistivity differing considerably from its surroundings. A layer of water along an interface may appear as a thin bed of low resistivity and produce the desired effect on the resistivity curve. Where the beds are thick and of resistivities which do not differ greatly, however, it is doubtful whether an empirical rule will give satisfactory results.—*W. A.*

3412. Terada, K., Thunderstorms as a cause of earth currents: Geophys. Mag., vol. 9, pp. 269–278, Tokyo, December 1935.

Six different ways are stated by which electric charges may pass to the earth from the atmosphere; by three of these positive charges are brought, by the other three negative. The approximate times during which electricity is brought down by each of these methods are calculated. This calculation, along with the distribution of methods according to latitude, enables the quantity brought down in each latitude to be arrived at. At the poles the positive charge enters, at the Equator a much greater negative charge, the unequal distribution being mainly due, according to the author, to the point-discharge currents from thunderstorms. The actual value of earth current obtained from these charges, however, is very small, so that unsettled weather conditions do not account for the whole earth current. But over a region where the specific conductivity is high such conditions may contribute a fair proportion of the total.—*A. E. M. G., Sci. Abstracts, vol. 39, no. 461, 1936.*

3413. Walter, A. J. P., Earth-resistivity measurements: Mining Mag., vol. 54, no. 6, pp. 341–345, London, 1936.

Deals with the elimination of computations for stake resistances. The method used results in a considerable saving of time, for as many as 300 measurements can be taken with the instrument during an 8-hour day.—*W. A.*

5. RADIOACTIVE METHODS

3414. Belluigi, A., Giacimenti oleiferi ed elio [Oil-bearing deposits and helium]: Ind. mineraria, 2 pp., Rome, September–October, 1934.

Discusses the radioactivity of oil and of helium in oil-bearing deposits. The presence of helium in the gas accompanying the oil is interesting from two viewpoints—(1) utilization of the helium and (2) prospecting for oil by radioactive methods. Study of the radioactivity of cores extracted from the bore holes and of drawing geo-radio-electro-thermophysical profiles is recommended.—*W. A.*

3415. Ehrenberg, W., The connection between cosmic-ray showers and bursts: Royal Soc. London Proc., ser. A, vol. 155, no. 886, pp. 532–545, July 1, 1936.

Recording of the ionization current in a cosmic-ray ionization chamber is controlled by triple coincidences of Geiger-Müller counters, so that knowledge of the variation of the number of showers with their size is obtained. The majority of showers produced in a lead shield consist of far more particles than are necessary to operate a triple coincidence set. The results of these experiments lead to the conclusion that bursts are showers measured by the ionization they produce.—*Author's abstract.*

3416. Follett, D. H., and Crawshaw, J. D., Cosmic-ray measurements under 30 meters of clay: Royal Soc. London Proc., ser. A, vol. 155, no. 886, pp. 546–558, July 1936.

The authors show that the shower producing radiation penetrates 30 meters of clay, and that the ratio (shower-rate) ÷ (vertical intensity) at that depth is not very different from that at ground level. The authors conclude from these results that a considerable part of the radiation which penetrates 30 meters of clay must consist of positive or negative electrons. The zenith angle distribution of cosmic rays at ground level has been shown to be the same as under 30 meters of clay, a result which is consistent with the conclusion that the intensity of radiation varies inversely as the square of the path length traversed.—*Author's abstract.*

3417. Israël-Köhler, H., and Becker, F., Proportion of emanation in ground air: Gerlands Beitr. Geophysik, vol. 48, no. 1, pp. 13–58, Leipzig, 1936.

Theoretical speculation and experimental determinations are given of the condition of emanations in air obtained from the ground, and from the dependency of the pressure of Rn at different depths, the existence, form, and depth of the tectonic heterogeneity can be predicted. Such experiments form a supplementary method of geophysical survey, which can be further augmented by measuring gases (CO_2; CH_2) which do not dissociate. The depth for which geological heterogeneity is perceptible by emanation at the surface is limited by the "prolificness" of the source of interruption. The most reliable analysis is the one based upon the distribution of atmospheric pressure in a relatively short depth. A review of the methods of determining the Th emanation in the ground air and some results of orientating surveys are given.—*H. M. B., Sci. Abstracts, vol. 39, no. 465, 1936.*

3418. Jeffreys, Harold, On the radioactivity of rocks: Gerlands Beitr. Geophysik, vol. 47, no. 1/2, pp. 149–171, Leipzig, 1936.

Statistical comparison of experimental determinations of radium and thorium in rocks is given. The purpose of the paper is to show what differences are adequately supported by the observations. Some of the differences are capable of more than one interpretation; suggestions are made for further investigation.

The author gives comparative values for the following rock types in different regions: (1) Granites; (2) granodiorites, granitites, hornblende granites, quartz trachytes; (3) gneisses; (4) syenites and trachytes; (5) diorites, andesites, dacites; (6) basalts, dolorites, diabases, norites, gabbros; (7) plateau basalts; (8) eclogites, poole; (9) peridotites, etc.; (10) dunites.—*W. A.*

3419. Montgomery, C. G., and Montgomery, D.D., The absorption of cosmic-ray showers by lead: Phys. Rev., vol. 49, no. 10, pp. 705–711, 1936.

The absorption in lead of the shower rays which produce the bursts of cosmic-ray ionization is measured by two methods. The first method consists in observing the ionization produced above and below a lead absorber placed across the center of an ionization chamber; the second is to observe the probability that a burst of ionization in a chamber is accompanied by a simultaneous discharge of three Geiger-Müller counters over one of which has been placed an absorber. The results of the two methods are in good accord and may be stated in the form that the probability that a ray of a shower will penetrate a thickness of lead decreases linearly with the thickness, becoming zero at approximately 11 centimeters. The experiments serve to emphasize again the high energies that are involved in a large shower. The results are applied to observations on the effect of shielding on the ionization observed in the stratosphere.—*Author's abstract.*

3420. Growth of knowledge of the ionosphere [editorial note]: Nature, vol. 137, no. 3475, p. 956, London, 1936.

Mentions Prof. S. K. Mitra's "Report on the present state of our knowledge of the ionosphere" appearing in the Proceedings of the National Institute of Sciences of India, 1935. This report presents the main results of both theoretical and experimental investigations on the ionosphere during the last 12 years.—*W. A.*

3421. Neuberger, H., Bemerkungen zu der Abhandlung von Herrn M. Bossolasco, Turin, "Über die Anzahl der Kondensationskerne in Mogadischu" [Remarks on M. Bossolasco's work "On the number of condensation nuclei in Mogadischu"]; Bossolasco, Mario, Erwiderung auf die Bemerkungen von Herrn H. Neuberger zu meiner Arbeit "Über die Anzahl der Kondensationskerne in Mogadischu" [Answer to the remarks of H. Neuberger concerning my work "On the number of condensation nuclei in Mogadischu"]: Gerlands Beitr. Geophysik, vol. 46, no. 1/2, 1935, pp. 208–217, Leipzig, 1935.

Bossolasco's article which caused the exchange of opinions indicated above was published in Gerlands Beitr. Geophysik, vol. 44, no. 1, pp. 1–15, 1935. (See Geophys. Abstracts 78.) The question concerned the correctness of the measurements of the nuclei of condensation made by Bossolasco on the North Sea (Island of Sylt) during the international polar year.—*W. A.*

3422. Nishina, Y., and Ishii, C., A cosmic-ray burst at a depth equivalent to 800 meters of water: Nature, vol. 138, no. 3495, pp. 721–722, London, Oct. 24, 1936.

Dr. Y. Nishina and C. Ishii have recently made measurements of cosmic-rays intensities in a railway tunnel under a vertical thickness of rock (diorite) varying from 1,230 to 120 meters, water equivalent about 3,400 and 340 meters, respectively. At a vertical thickness of 325 meters (minimum thickness 290 meters) a burst of 107 ions was observed, which proves the presence of cosmic rays after passing through rock the absorption of which is equivalent to that of more than 800 meters of water.—*Editor's abstract, p. 724.*

3423. Rothé, E., and Arlette, Hée, Étude d'une zone de contact de granite-gneiss par l'observation des rayons pénétrants [Study of a granite-gneiss contact by observation of penetrating radiation]: Acad. sci. Paris Comptes rendus, vol. 203, no. 3, pp. 268–270, July 20, 1936.

The great difference in the radioactivity of the granite of Bressoir with two micas (practically nil) and that of the porphyroid granite of the central Vosges (practically double that of any neighboring rock), usually containing much amphibole, affords a useful method for determining the zone of contact. Thus, within a short distance along the footpath from Brifosse to Chaumes de Lusse, the radioactivity falls by over 50 percent.—*C. A. S., Sci. Abstracts, vol. 39, no. 465, 1936.*

3424. Satterly, J., Age of the earth: Devonshire Assoc. Trans. 67, pp. 35–73, 1935.

After a brief account of the astronomical and geological methods of deducing limits to the age of the earth, a detailed account is given of the radioactive method of determining the age of rocks, as deduced from the amounts of U and Th, and the amount and atomic weight of Pb present therein, with examples worked out in full.—*C. A. S., Sci. Abstracts, vol. 39, no. 463, 1936.*

3425. Snarsky, A., Determination of the gas content of horizons by the radioactivity of the minerals: Azerbaidzhanskoe Neftianoe Khoziaistvo, no. 11/12, pp. 28–34, Baku, 1934.

On the basis of some experiments reported in the paper, the following conclusions were reached:

1. The radioactivity of minerals containing crude oil is of a sedimentary character.
2. Minerals of increased radioactivity may be considered indicators for the presence of gas.
3. Activity of individual mineral samples is possible, but it is due to enclosures of radioactive elements.
4. An increase in the activity of water-containing horizons is possible, and such horizons, if they contain gas, can be determined by means of prospecting, being characterized by their electrical resistance.
5. In the absence of suitable apparatus for determining the α-emanation, the soil will show a blurred maximum (by the Schlumberger method).
6. Because of diffusion properties of the gas through the minerals, and in the case of its activity and an accumulation in the upper mineral layers, the air will be activated, and the latter fact can be utilized for investigating the presence of gas and oil.—*Abstract in Inst. Petroleum Technologists Jour., vol. 22, no. 149, 1936.*

3426. Spicer, B. A., Emanation electroscope: Jour. Sci. Instruments, vol. 13, pp. 263–267, London, August 1936.

Describes an instrument for the estimation of quantities of Rn in the range of activities not covered by the existing emanation or γ-ray electroscopes. The sensitivity is controlled by a variable capacity.—*Author's abstract.*

3427. Ziemecki, St., and Narkiewicz-Jodko, K., Variation of cosmic-ray intensity with height in the atmosphere: Nature, vol. 137, no. 3475, p. 944, London, 1936.

Measurements of cosmic-ray intensity at points between 6,000 and 10,000 meters gave a smooth curve, the deviations from it not exceeding 5 percent and being in general less than 2 percent, contrary to the results obtained by Suckstorff, who found especially great discontinuities in higher regions between 7,000 and 9,700 meters. The discontinuities observed by Suckstorff were due to the irregularity of the movement of the electrometer tread, the Kolhörster apparatus not being sensitive enough for measurements of short duration. The curves showing Kolhörster measurements, those obtained by Suckstorff, and those obtained by the authors are given in a figure for comparison.—*W. A.*

6. GEOTHERMAL METHODS

3428. DeLury, J. S., and Lane, A. C., Radioactivity and geothermal gradients: Pan Am. Geologist, vol. 64, pp. 99–105, September 1935.

The main sources of earth heat are the relatively hot interior of the earth and the radioactive elements, which are commonly considered to be concentrated largely in the outermost shell. Geothermal gradients are very diverse largely because radioactive materials are very diverse in their concentration, and therefore radioactive materials are the dominant source of heat in outer shells of the earth.—*W. A.*

3429. DeLury, J. S., and Spivak, Joseph, Concomitants of diverse geothermal gradients: Pan Am. Geologist, vol. 64, pp. 185–192, October 1935.

Theories of intrusion and diastrophism must have cognizance of the limitations which are placed on them by physical conditions within the earth. The dominating factor in determining these conditions is heat, but thermal evidence has been interpreted in widely different ways in attempts to arrive at temperatures existing at various depths. Many hypotheses are built on assumptions of delicate adjustment of thermal conditions, which are vital to each particular hypothesis. It appears, therefore, that a solution of the geothermal problem is necessary in order that untenable hypotheses may be discarded, and to point the way to the correct diagnosis of the causes of earth movements. Interpretations of geothermal data are so diverse, however, that a solution may well appear to be hopeless. Nevertheless, the writers venture to approach the geothermal problem with the view that the evidence has so far been misused and that there are sufficient data to permit correct interpretation.—*Authors' introduction.*

3430. DeLury, J. S., Geological deductions from a thermal equation: Jour. Geology, vol. 44, no. 4, pp. 479–495, 1936.

A thermal source is indicated for the energy of earth distortion and deformation of the outer lithosphere. Heat is available and effective for these purposes in direct proportion to the unevenness of its distribution. Radioactive elements, which are considered to be the most important source of heat in outer shells, migrate extensively in geologic time through erosion and movements of magma. An investigation of the interplay in time of the factors of thermal conductivity and vertical horizontal distributions of radioactive elements seems to show that small fractional differences in each of these factors may decree important differences in geothermal history. Predictable effects of diversity of geothermal conditions, such as thermal distortion, magma generation, magma migration, and forced intrusion followed by deformation, are indicated. In addition some conclusions are drawn concerning the origin of batholiths and of certain types of extrusives.—*Author's abstract.*

3431. Wegener, Kurt, Die Temperatur am Boden des Grönländischen Inlandeises [The temperature at the bottom of the Greenland inland ice]: Zeitschr. Geophysik, vol. 12, no. 4, pp. 166–172, Braunschweig, 1936.

The temperature at the bottom of the inland ice is limited in the downward direction by the temperature of the ice surface, the thickness of the ice, and the heat current; in the upward direction by the melting temperature. Melting temperature prevails at the bottom of the inland ice.—*Author's abstract, translated by W. A.*

7. UNCLASSIFIED METHODS

3432. Antonov, P. L., On a variant of gas survey [in Russian]: Neftianoe Khoziaistvo, vol. 17, no. 8, pp. 27–29, Moscow, 1936.

Gas survey is, in general, based on the analysis of samples of soil air from depths of 1 to 1.5 meters. From the qualitative and quantitative results of the analysis conclusions on the existence of a deposit of gas or oil are drawn. The character of the distribution of the hydrocarbon gases diffusing from the various parts of a productive layer is shown in a figure. The results of the analyses of samples of the soil air are represented graphically in the form of a profile. The obtained minimum coincides with the position of the dome of the structure. The contours of the cap containing gas are determined by the positions of the points of the inflections of the curve. A few profiles obtained from preliminary measurements over known deposits are given.—*W. A.*

3433. Antonov, P. L., On the evaluation of the productive strata by the method of gas survey [in Russian]: Neftianoe Khoziaistvo, vol. 17, no. 8, pp. 29–31, Moscow, 1936.

A mathematical discussion of the approximate determination of the order of the pressure in the strata. The solution of the problem is based on the theory of the distribution of hydrocarbon gases in the intermediate layers. A long deposit of a small width is examined.—*W. A.*

3434. Bartels, J., Geophysical time functions: Preuss. Akad. Wiss. Ber. 30, pp. 504–522, Berlin, 1935.

A statistical theory of geophysical successions is worked out, which can be applied to arrays with a probability after-effect, especially to time series in geophysics. The tendency to conservation and quasi-persistence causes a considerable diminution of the observed material and changes in the usual statistical treatment, especially in proving the presence of periods. Examples are given.—*W. A. R., Sci. Abstracts, vol. 39, no. 463, 1936.*

3435. Bartels, J., Geophysical cycles: Washington Acad. Sci. Jour., vol. 26, pp. 195–199, May 15, 1936.

The author recommends statistical methods "not only for detecting significant cycles, but even more for checking the exuberant production of cycles".—*W. A. R., Sci. Abstracts, vol. 39, no. 463, 1936.*

3436. Bowie, William, Vertical movements of earth's crust as determined by leveling: Jour. Geology, vol. 44, no. 3, pp. 387–395, 1936.

The leveling net which has been extended over the country to serve many engineering purposes is used also to detect vertical movements in the earth's crust by re-running, at intervals, the lines in the net and comparing the results of the different runnings. In certain critical areas in California a number of the lines have been re-run, but so far the only area in which large changes have been found is in San Jose and vicinity.—*Author's abstract.*

3437 Charrin, P., La géophysique en Gulf coast en 1935 [Geophysics on the Gulf coast in 1935]: Rev. pétrolifère, no. 678, pp. 549–550, Paris, April 11, 1936.

A summary of the results of geophysical work in the Gulf coast region in 1935 is given. A comparison is made with the work in 1934 (Geophys. Abstracts 85, p. 1820). Seventeen new discoveries made in Texas and Louisiana and the amount of oil produced by them in 1935 are given in tables. The fields are grouped into three categories—those producing over 100,000 barrels a year, those producing less than 100,000, and unproductive fields.

An increase of about 21,000,000 barrels in comparison with 1934 is calculated. This increase is due mainly to the new geophysical discoveries; therefore, by estimating the expense for geophysical work during 1935 at about $7,000,000 or $8,000,000 the conclusion is drawn that these expenses were already covered three times by the increased production only (at $1 a barrel).—*W. A.*

3438. Geological and geophysical survey [editorial note]: Chem. Eng. and Min. Rev., vol. 28, no. 332, pp. 267–268, Melbourne, 1936.

In reviewing the geophysical work in northern Australia the author mentions the magnetic surveys made in the Tennant Creek region, where a number of magnetic anomalies that may prove to be of considerable importance were disclosed. Electromagnetic indications that may correspond to auriferous copper ore bodies were obtained in the Trekelano and Dobbyn areas. Electromagnetic indications were obtained also in the Mount Freda and Canteen areas.—*W. A.*

3439. DeLury, J. S., Magmas from subsidence: Am. Jour. Sci., 5th ser., vol. 23, pp. 357–368, April 1932.

The writer presents in this paper a hypothesis that seems to eliminate some of the difficulties which are inherent to current hypotheses of magma formation, magma intrusion, and explanations of the occurrence and association of divergent rock types. The hypothesis, moreover, besides seeming to meet the demands of igneous geology, appears to lead to a logical inter-relation of all crustal phenomena.

The present paper is written primarily to point out the probable importance of subsidence in the problems of magma formation and igneous intrusion. Certain inferences will be drawn concerning the bearing of the hypothesis on the questions of differentiation and assimilation. The strength of the conception as a whole, however, lies in its broad correlation of all crustal phenomena, so that its implications in other directions will be briefly indicated.—*Author's summary.*

3440. DeLury, J. S., Locus of magma formation: 5th Pacific Sci. Cong., A7, pp. 2285–2289, 1934.

An investigation of the evidence of horizontal variations in the crust leads to a mechanism of horizontal sheet flow in crust or subcrust, a mechanism which has already been deduced from the requirements of crustal structures (DeLury, The auto-traction hypothesis of crustal evolution: Univ. Manitoba, Dept. Geology and Mineralogy, Contr., 1931). The horizontal migration of magma on a broad scale permits an explanation of thermal conditions and thermal history which are anomalous under assumption of vertical adjustments. Even if the conclusions of the writer concerning thermal conditions in crust and earth are only approximately correct, their bearing on the major problems of the crust cannot be ignored. Generally speaking, strength increases with depth. There is no universal asthenosphere, but isostasy is disturbed and corrected locally by the same mechanism which operates in an earth that is only locally weak. Thermal distortion of the body of the earth leads to crustal distortion, which, in turn, leads to migration of magma in horizontal sheets, igneous intrusion, and accompanying crustal deformation. Present-day phenomena, such as changes of level, earthquakes, and volcanism, are effects which might be anticipated in all of their bearings from the thermal conditions of the crust and the crustal mechanism which these conditions seem to require.—*Author's abstract.*

3441. DeLury, J. S., Causes of crustal elevation and depression: Pan Am. Geologist, vol. 63, pp. 81–89, March 1935.

Unless the earth, as a whole, is weak, or there is a continuous shell of weakness, astronomic forces can have little or no effect in distorting the body of the earth. The author concludes that the earth has no weak shell, and that heat is very definitely the source of energy which eclipses all others in providing the forces for distortion.—*W. A.*

3442. Eve, A. S., Northern lights: Nature, vol. 137, no. 3472, Suppl., pp. 813–820, London, May 16, 1936.

The phenomenon of the "northern lights" is described under the following headings: (1) The upper air, (2) Sound of auroras, (3) Spectroscopic evidence, (4) Aurora and magnetism, (5) Aurora and the weather, (6) Exploring the upper atmosphere, (7) Radio waves, (8) Sunspots, (9) Meteors, and (10) Mother-of-pearl and noctilucent clouds.

The study of the northern lights is bound up with other physical phenomena in the upper regions of our atmosphere, and progress can best be made, as in other branches of science, by advance on a broad front.—*W. A.*

3443. Grenet, G., Revue de physique du globe [Review of the constitution of the earth]: Rev. gén. sci. pures et appl., vol. 27, no. 14, pp. 421–424, Paris, July 31, 1936.

Examines the electric phenomena of storms, terrestrial magnetism, and geophysical phenomena in connection with the activity of the sun, such as diurnal and accidental variations of the magnetic field, the polar lights, propagation of radio-electric waves, telluric currents, and theories of the influence of the sun upon the geophysical phenomena.—*W. A.*

3444. Hales, A. L., Convection currents in the earth: Royal Astron. Soc. Monthly Notices, Geophys. Suppl., vol. 3, pp. 372–379, April 1936.

The idea of convection currents in the outer shell of the earth is investigated, and it is found that currents sufficient to give the stress differences required by the gravity anomalies are possible.—*Author's abstract.*

3445. Heiland, C. A., Suggestions for an expansion of Mines Geophysics Department: Mines Mag., vol. 26, no. 9, pp. 33–37, Denver, 1936.

The importance of geophysical training and research is emphasized. Discusses the development of geophysics in the United States and other countries, geophysics and the mineral industries in Colorado, equipment for geophysics instruction and research, suggestions for teaching and research personnel, for addition to equipment, and for additional offices, lecture rooms, and laboratory space, and research problems for the immediate future.

Heiland mentions especially the following main problems on which the geophysicist's attention will be focused: (*a*) Locating oil directly by geophysical measurements; (*b*) adaptation of electrical methods to the direct location of gold in place and in placer gravels; (*c*) systematic investigation of abandoned mines with a view to locating extensions of ore bodies; and (*d*) systematic study and perfection of methods for the location of ground water.—*W. A.*

3446. Herrman, H., Stöcke, K., and Udluft, H., Ground pressure and plate statics; tests on the elastic properties of coal-measure rocks from Upper Silesian mines: Beitr. angew. Geophysik, vol. 5, no. 4, pp. 396–424, Leipzig, 1936.

This article, which was originally published in the Zeitschr. Berg-, Hütten- und Salinenwesen, vol. 82, no. 6, 1934 (see Geophys. Abstracts 74), is given here in English.

The authors' idea is that in the working of seams the rock layers are bent, and therefore pressure and stress effects are caused. The first part of this article deals with the laws of plates. Points of discussion are the distribution of the abutment pressure along plate edges on small nonelastic supports, the stresses and cracks in bent elastic plates, the influence of end conditions, more especially the difference between perfect and imperfect restraint. Examples from mining experiences follow which deal with the so-called Abdruck (pressure relief) as a consequence of plate laws, measurements of bends along the working face, pressure and stress effects beyond the working face in the intact area. An experiment made in a Lower Silesian coal mine shows the effects which the form of working-face line has in relation to the distribution of ground pressure. The mining conditions of the Andreasflöz 3, of the pit Königin Luise Westfield near Hindenburg (Upper Silesia) show that, owing to the working method here used, the pressure relief appears. Level subsidences in a higher situated main road explain the bending curves of the roof strata.—*Authors' abstract.*

3447. Jameson, M. H., Geophysical prospecting in the Witwatersrand gold fields: Mines Mag., vol. 26, no. 8, pp. 7–8, 29, Denver, August 1936.

The Witwatersrand system is divided into Upper and Lower groups, as follows: Upper, Kimberly-Elsburg series, Main Bird series; Lower, Jeppeston series, Government Reef series, Hospital Hill series.

The use of magnetic instruments to measure magnetic anomalies is confined to investigations of structural and stratigraphic conditions, and they are merely auxiliary aids to prospecting. The magnetic method has met with considerable success in the location of post-Karoo dikes and in determining the approximate location of the suboutcrops of three very strongly magnetic shale beds of the Lower Witwatersrand system. This method cannot, however, detect the Main Reef itself and cannot furnish reliable information as to the depth and dips of the Witwatersrand beds. Seismic reflection methods might be of considerable importance in this area in determining the thickness of the dolomites and Ventersdorp lavas. Dolomite basins could in all probability be mapped and avoided in mining operations; faults could be located and their throw measured.

Objections have been made to the use of seismic methods in determining the thickness of the dolomite because of its many cavities. In the region of the Venterspost Gold Mining Co., a shaft has proved the compactness of the dolomite of that area.

It is to be noted that the application of other geophysical methods would not eliminate the use of the magnetic method. Only through further experiments can the true scope of these methods be determined and their possibilities in the Witwatersrand area be established.—*Author's conclusion.*

3448. Judson, E. B., Comparison of data on the ionosphere, sun spots, and terrestrial magnetism: Nat. Bur. Standards Jour. Research, vol. 17, no. 3, pp. 323–330, 1936.

Ionosphere data of the National Bureau of Standards from 1930 to 1935 are compared with data on the earth's magnetic-field intensity and sunspot numbers. Seasonal variations of F_2 critical frequency and virtual height are compared with sunspot numbers and magnetic activity. Correlation of annual averages of the ionosphere critical frequencies with sunspot numbers is shown. Variations of midnight F_2 critical frequencies are compared with variations of sunspot numbers and magnetic activity.—*Author's abstract.*

3449. Jung, Karl, Geophysikalische Methoden zum Aufsuchen wichtiger Rohstofflager [Geophysical methods of prospecting for important raw-material deposits]: Chem. Zeitung, vol. 59, no. 42, pp. 425–427, 1935.

A general review of the most important geophysical methods of prospecting.—*W. A.*

3450. Kornfeld, J. H., Review of petroleum development in Texas: Petroleum Eng., vol. 7, no. 10, pp. 31–141, July 1936.

This long article is divided into eight parts, dealing divisionally with coastal Texas, east-central Texas, east Texas, north Texas, Texas Panhandle, southwest Texas, west-central Texas, and west Texas. In coastal Texas the Tomball field was a monument to geophysical exploration and was found by torsion balance. The Anhuae deep-seated salt-dome discovery was due to reflection-seismograph and torsion-balance methods and has proved the largest producer of the deep salt domes. The Schlumberger electrical surveying method is also largely used. Exploration of more than 60,000 acres has begun in Galveston Bay, with a fleet of 10 boats carrying seismic operators and apparatus. Gravel beds to a depth of 100 feet cause distortion velocities to the recording instruments unless shot points are drilled across a profile line and cased with 3-inch pipe. Routine practice utilizes shot points 40 feet in depth. Deep tests drilled in exploration work have been useful recently for geophone tests to determine wave velocities. The geophone is lowered to the bottom of the hole, and a charge of dynamite detonated at the surface. Correlation of unusual seismic pictures with those of known deep-seated domes is improving interpretation technique in recognizing anomalies of deep-seated domes, aided by correlation with regional minima as shown by torsion-balance work.

The Van oil field, a so-called ideal oil field, was indicated by the irregular dip at the surface of the lower Claiborne strata, and was checked by the core drill and reflection seismograph. The Buffalo oil field after the structure had been checked with geophysical instruments. Reflection-seismograph work revealed the "high" in the Long Lake oil field. Cayuga was discovered by reflection-seismograph surveys. The Red Lake structure was shown on torsion-balance evidence.

Major faults in the Balcones fault system are associated with masses of serpentine which represent peaks of weakness along regional fault displacements, occurring predominatingly on the upthrown side of local faults. Many of the larger plugs were successfully outlined by the magnetometer. Not all serpentine plugs were proved to be productive, although local uplift in association with a serpentine plug intrusion may be responsible for oil in overlying formations—for example, in the Chacon Lake oil field. Up to January 1, 1934, a total production of 15,700,400 barrels was recorded from 15 fields in serpentine or altered igneous material.

The existence of favorable structure near Lodi, Marion County, proved by intensive seismograph geophysical surveys, led to the extension westward from Caddo, La., of the large Rodessa oil field into Cass County, Tex.

Seismograph exploration by obtaining anomalies of the salt-dome type and a shallow sulphur dome seem to prove the existence of a salt-dome basin like the Texas and Louisiana coastal portions of the Gulf of Mexico embayment, the indications being that a huge basin exists in northern Mexico and that large oil reservoirs will have accumulated at the edge lines of the numerous sands in the Eocene, Oligocene, and

Miocene series. Owing to the great thickness of gravel beds in the Rio Grande extension of the Reynosa escarpment, which will be a hindrance to the reflection seismograph, the torsion balance, magnetometer, and other geophysical methods will be more extensively used. Lack of surface mounds, although salt deposits exist, renders detection of structure by surface geology almost impossible. After a reflection-seismograph survey disclosed the structure, the Mercedes oil field was discovered.—*Adapted from B. F. N. M., Inst. Petroleum Technologists Jour., vol. 22, no. 155, 1936.*

3451. Krahmann, R., Geophysical investigations upon mineral deposits in southern Africa: Beitr. angew. Geophysik, vol. 5, no. 4, pp. 425–450, Leipzig, 1936.

This is the second compilation, the first having been completed up to the end of June 1933 (see Geophys. Abstracts 61, p. 1145), and this one to end of June 1934.

The various geophysical investigations in the tables are classified according to the different physical methods employed.

The literature index has been divided into different groups according to the classification as given in the tables.—*W. A.*

3452. McFadyen, A. D., Science versus magic: Sci. Am., vol. 92, pp. 212–215, October 1936.

A popular description of various methods of geophysical prospecting for oil, accompanied by 10 figures.—*W. A.*

3453. Permiakov, J. G., Conditions favorable for oil deposits and the further direction for prospecting in the region of Emba [in Russian]: Neftianoe Khoziaistvo, vol. 17, no. 4, pp. 26–33, Moscow, April 1936.

Discusses characteristics of the region of the outcrops of oil-bearing beds, formation of salt domes in the Emba region, classification of salt domes, interdome structures, favorable conditions for the formation of oil deposits in the zones of salt domes, and types of deposits connected with salt domes, including contact deposits, deep structures, and buried structures. The article is illustrated by 21 figures.—*W. A.*

3454. Principles and practical results of geophysics [editorial note]: Petroleum Times, vol. 36, no. 916, pp. 141, i–xlviii, London, Aug. 1, 1936.

The article is divided into six main sections:

1. History of geophysics (magnetism; electrical methods; gravimetric methods; seismic methods). After a brief historical outline of the search for minerals the author concludes that the industrial use of geophysics began about 1920. A table outlining the development of geophysics as it appeared in December 1935 is given, though the author does not guarantee the strict accuracy of the figures. The number of geophysical parties working with all methods is estimated as follows: United States, 172; U. S. S. R., 84; Central America, 16; Argentina, 4; Canada, 6; Africa, 7; Rumania, 6; Europe (except U. S. S. R. and Rumania), 14; Asia (except U. S. S. R.), East Indies, Oceania, 13; total, 332.

2. Present position as to geophysical methods surveyed (gravimetric methods, magnetometry, seismic prospecting, electrical prospecting, future of geophysics, economic aspects of geophysics). The methods are summarized in two tables. The first, which corresponds to the "tools" used by the geophysicist, indicates the various techniques utilized, with their essential characteristics. The second table enumerates the practical "problems" which may be met, and gives for each one the most suitable method to apply.

3. Electrical exploration of drill holes (electrical resistivities of rocks, measurement of electrical resistivities, spontaneous currents inside drill holes, measurement of spontaneous potentials, application of electrical logs). Schlumberger's "electrical coring" method is described in detail.

4. Geophysical prospecting technique (static methods, electrical methods, seismic methods). The methods are described in detail.

5. World-wide geophysical operations and results (Canada, United States, U. S. S. R., France, North Africa, Rumania, Germany, Spain, Poland, Austria and Czechoslovakia, Italy, the Balkans, Africa, Venezuela and Trinidad, Argentina, Brazil, Chile, Asia (except U. S. S. R.), Malay Archipelago, Australia, New Zealand). A brief outline of the geophysical work carried out in these countries, with the essential results obtained.

6. World geophysical organizations.—Principal companies carrying out geophysical work (except oil companies that have their own geophysical departments) in the United States, France, Italy, Germany, Poland, Sweden, and United Kingdom are mentioned.

The article is illustrated by a great number of photographs, maps, and graphs.—*W. A.*

3455. Liogenky, S., Application of geophysical methods in searching for pegmatite veins in northern Karelia: Leningrad Geol. Trust Bull. 1, pp. 37–57, 1936.

The possibility of applying geophysical methods for detecting pegmatite veins was tested in the region of the Samoilovich mine, in northern Karelia. The operations were limited by drawing several profiles of well-known deposits. Electrical, radioactive, and magnetic methods were applied. Characteristic anomalies were detected by all the methods, except that of precise magnetometry. The results obtained are represented in a series of profiles. The practical problems of detecting pegmatite deposits can be solved best by the electrical methods. For checking anomalies to determine the attitude of pegmatite veins, their thickness, etc., the gravity and emanation methods should be used.—*W. A.*

3456. Northern Australian aerial and geological survey [editorial note]: Queensland Govt. Min. Jour., vol. 37, no. 432, pp. 160–161, Brisbane, 1936.

A brief summary of the report of the Committee of Direction and Control of the Northern Australia Survey for the half year ended December 31, 1935. Geophysical surveys included (1) a magnetic survey of the Tennant Creek gold field, where several magnetic anomalies were discovered. An exceptionally large magnetic anomaly indicated a large body of magnetic iron ore lying at a depth of about 300 feet. (2) Electromagnetic indications that may correspond to auriferous copper ore bodies were obtained in the Trekelano and Dobbyn areas. (3) Electromagnetic indications were also obtained in the Mount Freda and Canteen areas (Soldier's Cap).—*W. A.*

3457. Rosaire, E. E., Geophysical prospecting for petroleum: Military Eng., vol. 28, no. 161, pp. 351–354, Washington, 1936.

Shows in two maps proved domes of fields discovered nongeophysically in 36 years, and proved domes of fields discovered geophysically in 12 years, in Texas and Louisiana. The last section of the article deals with possible military adaptations. Should another war occur in which the opponents are comparably equipped with modern weapons, it is inevitable that sound-ranging methods will again be used.—*W. A.*

3458. Safronov, N. I., On the "aureoles of dissemination" of mineral deposits and their use in prospecting [in Russian]: Problems of Soviet Geology, vol. 6, no. 4, pp. 302–323, Moscow, 1936.

Outcrops of primary deposits are regularly connected with zones of accumulation of products of disintegration resting more or less in place, rich in characteristic or useful elements of the deposit in different phases.

For these zones the author proposes the name "aureoles of dissemination" and divides them according to the state of the contained characteristic or useful element into "salt", "mechanical", and "gaseous" aureoles. In the "salt aureoles" the characteristic or useful element is presented in liquid state (as easily soluble salt), in mechanical aureoles in the shape of stable minerals, and in gaseous aureoles in the form of gas.

The search for aureoles is made by means of the physico-chemical method of prospecting based upon a testing of surface formations on a large scale by means of the exact methods of physico-chemical analysis.

For the search for salt aureoles of dissemination is recommended the use of selective electrodes and a polarographic analysis on the basis of an electro-analysis; for mechanical aureoles, spectro-metallometrical surveys.

In order to corroborate his conclusion on methods, the author quotes several examples from the work done successfully in 1935 by the geophysical department of the Central Scientific Geological and Prospecting Institute on very different deposits (polymetallic, borate, tin deposits).—*Adapted from author's abstract.*

3459. Sawtelle, George, Salt-dome statistics: Am. Assoc. Petroleum Geologists Bull., vol. 20, no. 6, pp. 726–735, 1936.

Data on discovery, geology, and production of the Gulf coast salt domes. The locations of the 141 salt domes known in the Texas-Louisiana Gulf coast area are shown on a map.—*W. A.*

3460. Schleusener, Alfred, Über Deformationen der Niveauflächen durch bergmännischen Abbau und andere künstliche Massenbewegungen (Deformation of level surfaces caused by mining and other artificial mass movements): Beitr. angew. Geophysik, vol. 5, no. 4, pp. 480–518, Leipzig, 1936.

From the works of Galle and Helmert it is well known that equipotential surfaces of the earth are considerably influenced by hills and mountains. This treatise considers whether large deformations of equipotential surfaces are caused also by artificial mass movements.

Calculations of the changes of the level surfaces caused by the change of the distribution of masses, and calculations of plumb-line deviations are given. The measurements made at the Oldau Lock serve as a proof of the applicability of the conclusive formulas. They may also be applied for artificial mass movements.

The influence of the extraction of 1 milliard tons of hard coal is shown in a figure. The example as applied to Upper Silesia shows that the equipotential surface subsidence occasioned by 40 years of mining amounts to about only 1 millimeter. In the Ruhr district the change in the equipotential surfaces by mining is probably about 3 millimeters. A few other examples are discussed.

The conclusion drawn is that precise levels in special cases may be influenced by reason of artificial mass movements, but in general these changes are very slight only.—*W. A.*

3461. Sineritz, J. de, Geophysical studies in Spain: Rev. pétrolifère, no. 681, p. 643, 1936.

An account of geophysical work (electric, gravimetric, magnetic, and seismic methods) by the Spanish Government since 1927. Successful discoveries of faults, artesian-water sources, salt formations, etc., are mentioned.—*W. A.*

3462. Sokolov, V. A., La prospection gazeuse [The gas survey]: Rev. pétrolifère, no. 700, pp. 1381–1385, Paris, Sept. 12, 1936.

Owing to the fact that geophysical methods of prospecting give only information on underground structure without disclosing the location and contours of oil and gas deposits, the author proposes a new method of prospecting for oil and gas, called the "gas survey." This method consists of taking samples of soil air at depths of 2 to 10 meters and analyzing these samples with regard to their content of hydrocarbons. The main conditions necessary for the accumulation of oil and gas deposits, such as the existence of mother rock, of reservoirs in which oil and gas may accumulate, of structure favorable for deposits of industrial value, and of a roof sufficient for protecting the deposit from dispersion into the atmosphere, must, of course, be fulfilled. These conditions can be determined by the usual geophysical methods. The principle of the gas survey, apparatus, and the interpretation of the results are briefly described, based on the work done over well-known deposits in the region of Baku. Profiles showing the content of heavy hydrocarbons and methane are given, and the locations of productive and unproductive deposits are determined.

From the comparison of the data obtained by the gas survey with the real productivity of oil and gas in this region, the author concluded that high concentrations, as a rule, corresponded to the productive zones as established by drilling.

The applicability of gas survey in practice is considered to be possible after some further development of the methods of work.—*W. A.*

3463. Sokolov, V. A., On the methods of the interpretation of gas surveys: Neftianoe Khoziaistvo, vol. 17, no. 5, pp. 18–23, Moscow, 1936.

The following factors may aid in the interpretation of gas surveys and in the location of oil or gas: (1) The absolute value of the content of hydrocarbons, (2) the content of hydrocarbons according to the profiles, (3) the isolines of the content of hydrocarbons, and (4) the qualitative composition of hydrocarbons.—*W. A.*

3464. An Institute of Geophysics [editorial note]: South African Min. and Eng. Jour., vol. 47, no. 2257, p. 291, Johannesburg, 1936.

The establishment of an institute to be named "The Bernard Price Institute for Geophysical Research" is announced in this note. In addition to developing the work carried on at the University of Cape Town on lightning and cosmic-ray problems, the institute will deal with problems connected with meteorology, applied geology, geophysical prospecting, and radio communication as applied to the location of atmospheric depressions and temperature gradients in the earth's crust. Geophysical prospecting in connection with the exploration and development of new mining areas, particularly on the extensions of the Witwatersrand gold field, will receive special attention.—*A. E.*

3465. Stechhöfer, Stephan, Erdstrahlungsmessungen mit dem Geiger-Müller-Zählrohr und elektrische Feldstärkenmessungen im Gelände [Earth radiation measurements with the Geiger-Müller counter tube and electrical-field intensity measurements in the field: Zeitschr. Geophysik, vol. 12, no. 2/3, pp. 68–86, Braunschweig, 1936.

The author draws from his measurements the conclusion that the divining-rod effect was not caused either by the penetrating radiation or by a disturbance of the electrical field.—*W. A.*

3466. Tucker, Mitchell, Extensive leasing follows discovery of Smackover Permian production: Oil and Gas Jour., vol. 35, no. 8, pp. 25–26, Tulsa, Okla., 1936.

Active search for favorable structural traps and points of oil accumulation continues throughout the "Permian basin" of Arkansas and Louisiana. At present there are 20 seismograph, 2 magnetometer, and 1 torsion-balance crews actively engaged in this search. Extensive exploratory work in this territory must, according to the author, be done by geophysical means. In a résumé of geology and the occurrence of petroleum made in 1934 by the United States Geological Survey, the following was said in this regard: "Although the surface geology of the Arkansas Coastal Plain cannot be ignored as an essential preparatory basis for other types of exploration, virtually all of the future exploration will be guided primarily by geophysical investigations, subsurface studies, and actual drilling, with surface indications of minor importance."—*W. A.*

3467. Whipple, F. J. W., Strains in an elastic solid: Royal Astron. Soc. Monthly Notices, Geophys. Suppl., vol. 3, pp. 380–388, April 1936.

The distribution of strain in a semi-infinite solid is discussed on the supposition that the solid is homogeneous, that there are no external forces, and that the strains in the immediate neighborhood of an internal nucleus are of a specific type. Formulas are given for the displacements of the surface. It is found that elevation of the surface is associated with radial displacement outward from a central point, and depression with displacement inward. The bearing of this theory on seismology is briefly discussed.—*Author's abstract.*

3468. Williams, Neil, 260 geophysical crews active in field exploration work: Oil and Gas Jour., vol. 35, no. 18, p. 25, Tulsa, Okla., 1936.

There are now more than 260 geophysical crews at work, an increase between 50 and 60 within 6 months. The crews are distributed as follows: Texas Gulf coast, 50; Louisiana Gulf coast, 33; north Louisiana, Arkansas, and northeast Texas, 27; Oklahoma and Kansas, 50; California, 27; Wyoming, 6; Illinois, 7. This check does not show any crews operating in Nebraska, New York, and other Eastern States.

The industry is spending about $14,000,000 annually on geophysical exploration. This figure is based on an estimated average monthly cost of $4,500 to $5,000 per crew. It is figured that the discovery of one or two good fields each year repays the cost many times over. On the Gulf coast alone 15 fields whose discovery is directly attributed to geophysics have been opened this year. Since the introduction of geophysics 97 fields, exclusive of those in the lower Gulf coast district and southwest Texas, have been opened as a result of geophysics. Altogether, 154 fields and domes have been found on the Gulf coast. Most of the geophysical exploration now under way is being done by shooting crews. Of the total of 260 crews now active, 210 are using the seismograph, 36 are operating torsion balances, and 14 magnetometer, pendulum, gravitometer or one of the various electrical instruments. Reflection shooting is most prevalent.—*W. A.*

3469. Wyszynski, O. V., Die Erforschungsarbeiten in Polen, ausgeführt durch die "Pionier" A. G. [Prospecting work in Poland carried on by the "Pioneer" Co.]: Petroleum Zeitschr., vol. 32, no. 23, pp. 31–34, Berlin, 1936.

The Pioneer Co. is organized and supported by all the large companies in Poland for the purpose of exploration of new oil regions and for the adaptation of new methods of prospecting to the geologic conditions of Poland. The regions in which geophysical work (magnetic, gravimetrical, and seismic methods) has been done since 1929 are mentioned, and the results obtained are briefly described.—*W. A.*

8. GEOLOGY

3470. Halbouty, M. T., Geology and geophysics showing cap rock and salt overhang of High Island dome, Galveston County, Tex.: Am. Assoc. Petroleum Geologists Bull., vol. 20, no. 5, pp. 560–611, 1936.

The High Island dome was first drilled for oil in 1901; the first production was obtained from the porous cap rock in 1922, on the superdome structure. The Yount-Lee Oil Co. in 1931 proved the existence of an overhang at High Island and has since developed the field from the northwest flank to the southeast flank. The development at present is toward the east flank.

The cap rock at High Island is divided into a false cap rock and a true cap rock. The false cap rock is a hard sand and lime rock ranging in thickness from 200 to 1,300 feet. The true cap rock lies underneath the false cap rock and consists of a series of caps. At the base of the series is anhydrite, which grades upward into gypsum and a calcite cap above the gypsum.

The overhang has so far been proved to exist on all flanks that have been drilled. There is a cap-rock overhang as well as a salt overhang; the cap-rock overhang extends outward and away from the salt. Production is just as abundant under the cap-rock overhang as under the salt overhang. The dome is somewhat lopsided in that the southeast flank is about 1,500 feet higher than the northwest flank. Faults have been detected on the south and southeast flanks. A theoretical peripheral fault is mapped from the northwest to the southwest flank. Oil has been produced in commercial quantities from the cap rock, Pliocene formation, Miocene formation, M Dv zone, *Discorbis* zone, and *Marginulina* zone. The *Heterostegina* zone at High Island has not yet been penetrated or encountered. The Pliocene and Miocene production is very small, and practically all the sands in these two formations contain water.

The M Dv zone is a new paleontologic zone of lower Miocene age mapped by the writer as lying immediately above the true *Discorbis* zone of the middle Oligocene. This new zone is characterized by both lower Miocene and true *Discorbis* fauna. The name M Dv has been chosen to represent the zone because of the occurrence of a Miocene fauna associated with *Discorbis* cf. *D. vilardeboana* and its fauna.

The M Dv zone has so far proved to be the most productive of all the zones. Sands at six different horizons have been found in it. The production of the *Discorbis* zone has been slight, but some of the company's latest and best wells are producing from this zone. Only one sand has been found in the *Marginulina* zone. The oil at High Island is divided into three types, ranging from 24° to 44° A. P. I. gravity.

The seismograph survey of the flanks of the High Island dome was made in October 1934, by the McCollum Exploration Co.—*Adapted from author's abstract.*

3471. Kelley, V. C., and Soske, J. L., Origin of the Salton volcanic domes, Salton Sea, California: Jour. Geology, vol. 44, no. 4, pp. 496–509, 1936.

The location of the Salton volcanic domes and the alinement of the associated mud volcanoes strongly suggest their affiliation with the buried extensions of the San Andreas fault. Two surface trends are evident—the northeastward locus of the volcanoes, and the northwestward line of mud geysers. The latter coincides almost exactly with a southeastward extension of the San Andreas fault from 15 miles to the northwest. A detailed magnetic survey indicates that the subsurface material is not confined to the immediate vicinity of the domes. Steep magnetic gradients observed over the flats some distance from the line of volcanic hills are interpreted as the magnetic effect of the sloping surface of the underground igneous mass. In consequence of wind-directed wave attack during the presence of Lake Cahuilla and Salton Sea the lighter pumiceous materials have been concentrated to the lee of the hills in wave-built terraces or "tails," which at the southernmost volcano have accumulated in sufficient quantities to be of commercial importance. At this same volcano a peripheral distribution of obsidian with relation to pumice leads to a unique interpretation of its structure and origin. Fumarolic carbon dioxide gas trapped in the valley sediments to the northeast of the domes has been recently exploited for the manufacture of "dry ice."—*Authors' abstract.*

9. NEW BOOKS

3472. Amaral, I. C. do, and Souza, H. C. A., Prospecção geophysica em São Paulo [Geophysical prospecting in São Paulo]: Ministerio da agricultura, Departamento nacional da producção mineral, Brazil, Bull. 10, 1936, 100 pp., 28 figures and 8 maps, Rio de Janeiro, 1936.

Contains three articles: (1) Detailed magnetic survey of the areas of São Pedro-Xarqueada, by I. C. do Amaral and D. S. Oddone; (2) Gravimetrical survey of the São Pedro area, by H. C. A. de Souza and M. Y. dos Guaranys; and (3) Magnetic survey of elevated places ("elevações") of Pitanga and Páu d' Lho.—*W. A.*

3473. Année polaire internationale, 1932-33: Participation française, vol. 1, Introduction, terrestrial magnetism, polar auroras, atmospheric ozone, cosmic rays, 413 pp., Paris, Gauthier-Villars, 1936.

The present publication constitutes the first volume of results obtained by the French expedition to Scoresby Sound during the second international polar year 1932–33 and is issued by the French commission for the polar year. The first section of the present volume, by J. P. Rothé, deals with the magnetic data obtained at Scoresby Sound from November 24, 1932, to August 14, 1933. The following subjects are discussed: Instruments employed, absolute measurements, polar auroras and magnetism, diurnal and annual variation of the magnetic field, solar and magnetic activity.—*W. A.*

3474. Bellamy, E. F., Index catalogue of epicenters for 1913–30, 40 pp., Isle of Wight, County Press, Newport, 1936.

In the University Observatory at Oxford two catalogs of epicenters are kept, one arranged in order of latitude, the other in that of longitude, with the dates on which the corresponding foci have been in action since 1913. This book is a reproduction of both these catalogs.—*W. A.*

3475. Bergtechnisches Taschenwörterbuch [Technical-mining pocket dictionary] part 2, German-English, Essen, Verlag Glückauf G. m. b. H., 1936. Price, RM. 4.20.

3476. Bowie, William, Geodetic operations in the United States, January 1, 1933 to December 31, 1935: U. S. Coast and Geodetic Survey Special Pub. 207, 25 pp., 1936.

Contents: General statement; Triangulation and leveling nets; Statistical data for triangulation executed; Triangulation methods; Measurements of base lines; Theodolite tests; Plane-coordinate systems; Local control surveys; Topographic mapping; Special geodetic work in California; Triangulation adjustments; Geodetic publications issued since January 1, 1933; Gravity determinations; Tidal stations and observations; Isostasy; Federal Board of Surveys and Maps; Section of Geodesy, American Geophysical Union; Surveying and mapping division, American Society of Civil Engineers.

Special articles: (1) Geodetic operations, Corps of Engineers, United States Army, by F. S. Besson; (2) Geodetic operations of the United States Geological Survey, by W. C. Mendenhall; (3) Adjustment of the triangulation on the North American datum of 1927, by Walter F. Reynolds; (4) Projections and plane-coordinate system, by O. S. Adams; (5) Local control surveys, by H. W. Hemple; (6) The United States Naval Observatory time service and variation of latitude work, by Paul Sollenberger; (7) Gravity and geodetic astronomy, by C. H. Swick; (8) Variations in yearly sea level, by Paul Schuremann.

3477. Brown, E. G., A determination of the relative values of gravity at Potsdam and Washington: U. S. Coast and Geodetic Survey Special Pub. 204, 15 pp., 1936. Price 10 cents.

The present publication is an account of the new gravity connection by the relative method between Washington, D. C., and the world gravity base station at Potsdam, Germany, made by E. G. Brown, of the Coast and Geodetic Survey, in the winter of 1932–33. Contents: Historical introduction; Program of observations; Apparatus and observing methods; Locations and elevations of stations; Chronology; Results of observations.

3478. Brunner, G. J., Chart of depth, time, and distance for deep-focus earthquakes, accompanied by a booklet: The Brunner focal depth-time-distance chart, by G. J. Brunner and J. B. Macelwane, New York, John Wiley & Sons, Inc., 1935.

The booklet describes the construction of the curves, which were based on several special studies by Brunner, Stechschulte, Scrase, and Wadati. Rules for use of the chart are presented.

3479. Information book on terrestrial magnetism and electricity, edited by N. W. Pushkow, 69 pp., Sloutzk (near Leningrad), Central Magnetic Observatory, 1936. Price, rubles 3.00.

The book contains the following articles (in Russian): (1) General magnetic survey of U. S. S. R., 1931–35, by N. N. Trubiachinski; (2) The Warsaw meeting of the Commission of Terrestrial Magnetism and Atmospheric Electricity, September 1935; (3) Some data of researches in terrestrial magnetism and atmospheric electricity during the international polar year, by N. W. Pushkow; (4) Communication on the work carried out on terrestrial magnetism and atmospheric electricity in the U. S. S. R. during the period from 1931 to 1935, by N. W. Pushkow; (5) The new magnetic laboratory at Sloutzk, by B. M. Janowski; (6) Magnetic laboratory of the geophysical station in Kawgolowo, by A. A. Logachew; (7) The new magnetic observatory in Nijnedevitzk, by P. J. Gusew; (8) Temperature changes in the higher atmosphere (translation) by E. V. Appleton; (9) Radioactivity of the atmosphere and aerial masses, by E. J. Merkulowa; (10) On the principle of magnetic cartography, by B. Weinberg; (11) The apparatus for direct determinations of vertical component of terrestrial magnetic field, by B. E. Brunneli; (12) On the question of the accuracy of determination of the inclination by Lamont's method, by N. P. Benkowa; (13) Micromagnetic survey of the molybdenum deposits at Parandova and Pjaavara, by J. M. Pudowkin; (14) Terrestrial magnetism work carried out by the expedition in 1935 on the "Malygin" by P. E. Fedulow; (15) New type of the magnetometric balance B. M. (La balance magnétométrique, designed by de LaCour), by N. W. Pushkow; (16) A new type of Z-variometer (designed by the Carnegie Institution, Department of Terrestrial Magnetism and Atmospheric Electricity), by N. W. Pushkow; (17) Apparatus registering the conductivity of the air in the stratosphere, by M. J. Bobarykowa; (18) Comparison of the observatory's standards by apparatus sent by post, by N. W. Pushkow; (19) Net of stations with rapid registration, by N. W. Pushkow; (20) Review of the Sun's activity, by E. T. Perepelkin; (21) Review of the terrestrial magnetic activity, by G. N. Kalitina; (22) Review of the conditions of broadcasting, by B. F. Arkhangelski and N. J. Lenshin. In addition to these articles the book contains notes and communications, reviews and abstracts, and a list of foreign and Russian publications.

3480. Chapman, S., The earth's magnetism, 112 pp., London, Methuen & Co., Ltd., 1936.

The brief but fairly comprehensive monograph by Dr. Chapman is very welcome, especially since it serves as a forerunner of a much more extensive and detailed treatment of the subject which the author hopes to publish shortly in collaboration with Prof. J. Bartels.—*Review by H. D. Harradon, Terrestrial Magnetism, vol. 41, no. 3, p. 264, 1936.*

3481. Cloos, H., Einführung in die Geologie; ein Lehrbuch der inneren Dynamik [Introduction in geology; handbook of interior dynamics], 503 pp., 356 figs., 3 tables, Berlin, Gebrüder Borntraeger, 1936. Price, RM. 24.

Part 3 of the book deals with the interior of the earth, discussing (1) physical methods for investigating the subsoil; (2) subsoil and the interior of the earth; (3) conditions and causes of the formation of the earth's crust.

3482. Coast and Geodetic Survey, Tables for determining the form of the geoid and its indirect effect on gravity: Special Pub. 199, issue of 1936. Price, 15 cents.

Contents: Part 1, Fundamental tables; part 2, Density of compensation for computing special Bowie tables; part 3, Bowie isostatic reduction tables; part 4, Determination of the geoid from gravity anomalies. In addition there is an appendix containing a number of miscellaneous tables. The present publication is intended to facilitate the solution of problems involving the deviation of the geoid from the spheroid of reference, with especial reference to the intensity of gravity.

3483. Coast and Geodetic Survey, Earthquake investigations in California, 1934–35: Special Pub. 201, 231 pp., 124 figs., 1936. Price, 35 cents.

Contains the following articles: (1) Field parties and problems, by F. P. Ulrich; (2) Strong-motion program and tiltmeters, by N. H. Heck, H. E. McComb, and F. P. Ulrich; (3) The analysis of records, by F. Neumann; (4) The questionnaire program for collecting earthquake data, by P. Byerly and H. Dyk; (5) Vibration observations, by D. S. Carder, with introduction by L. S. Jacobsen; (6) Vibration studies, by R. S. McLean and W. W. Moore; (7) The building and ground vibrator, by J. A. Blume, with introduction by L. S. Jacobsen; (8) A report on earthquake damage to type 3 buildings in Long Beach, by R. R. Martel; (9) Periods of the ground in southern California earthquakes, by B. Gutenberg; (10) Preliminary report on four-unit portable seismograph, by H. Benioff; (11) Geodetic work in earthquake regions in California, by W. F. Reynolds and H. S. Rappleye.

3484. Dominion Observatory, Wellington, New Zealand, Dept. Sci. and Ind. Research, Bulls. E51 and E52, 1936.

Seismologic reports from New Zealand stations.

3485. Efimov, I. E., and Rusakov, V. P., Geophysics, collection of articles in connection with the study of western region, 148 pp., with figures and maps, 1935. Smolensk, U. S. S. R., no. 3. Price, rubles 4.65.

Contents: (1) Isotopes of radioactive elements and the determination of the geological age of rocks, by V. P. Rusakov; (2) Methods of determining the content of radium and of the radioactivity of phosphorites, by V. P. Rusakov and A. G. Pogrebov; (3) Preliminary magnetic surveys in the region of the lakes Divo and Svadetskoe, western region; (4) On the temperature of trees, by I. Efimov; (5) Microclimate in the region of the Kardymovo station, western region, by I. Efimov; (6) Results of the actinometric observations in the region of the Kardymovo station, by I. Efimov; (7) Radioactivity of the water sources in the region of the Kardymovo station, by A. Pogrebov; (8) Sun radiation and the transparency of the earth's atmosphere in Smolensk during 1932, by O. M. Davidovich; (9) On the technique of the working out of actinometric and meteorological material, by O. M. Davidovich; (10) Detailed magnetic survey of one part of the Plokhinsk anomaly in the western region, by A. M. Berezkin and A. Virin; (11) Radioactivity of phosphorites in the region of the Volga River, by P. M. Anokhin and Ch. A. Mozolensky.

3486. Forberger, Karl, Magnetische Bodenforschungen im ausseralpinen Wiener Becken und am Alpenrand bei Wien [Magnetic prospecting in the outer Alpine Vienna Basin and on the border of the Alps near Vienna], with introduction by W. Petrascheck, 4 maps and profiles of Austria, Petroleum Inst., Vienna 1, Eschenbachgasse 9, Verlag für Fachliteratur Ges. m. b. H., Vienna 19, Vegegasse 4, 1935. Price, 6 shillings=3 marks.

3487. Geophysical prospecting in the Ukraine [in Ukrainian], vol. 1, 216 pp., Kiev., 1936. Price, 6 rubles.

This symposium contains the following articles: (1) Geophysical prospecting in the Ukraine, by D. V. Babienko, pp. 5–27; (2) Twenty years of magnetometric work in the S. R. S. R., by A. A. Strona, pp. 28–43; (3) Magnetic anomalies of the Pobuzhie (area along the river of Bug), by D. V. Babienko, pp. 44–126; (4) On the study of magnetic anomalies, by K. G. Bronstein, pp. 127–133; (5) Magnetic surveys in the region of Zhitomir-Korosten-Radomishl, by T. T. Miloshevich, pp. 134–146; (6) Results of magnetic surveys in the regions of Melitopol-Berdiansk and Orekhovo-Pavlograd, by P. P. Kuznetzov, pp. 147–164; (7) Determination of the subterranean relief by electrical profiling, by A. S. Glusbar, pp. 165–190; (8) Seismic prospecting in the Ukraine up to 1935, by P. M. Karatygin, pp. 191–194; (9) Seismic prospecting in the Ukraine in 1935, by V. S. Zavistovsky and T. A. Balabushevich, pp. 195–200; (10) Gravimetrical measurements in the region of Romni, by T. S. Subotin, pp. 201–205. Pages 206–216 contain notes, reviews, and chronologic records.

3488. Hazard, D. L., Results of observations made at the United States Coast and Geodetic Survey magnetic observatory near Tucson, Ariz., in 1927 and 1928, 114 pp., U. S. Coast and Geodetic Survey, 1935.

Contents: (1) Introduction; (2) Instruments; (3) Constants of magnetograph; (4) Absolute observations and base-line values; (5) Diurnal variations; (6) Summary of monthly and annual means; (7) Hourly values of declination, 1927; (8) Hourly values of vertical intensity, 1927; (9) Hourly values of declination, 1928; (10) Hourly values of horizontal intensity, 1928; (11) Hourly values of vertical intensity, 1928; (12) Magnetic storms. Contains 14 figures, reproductions of magnetograms showing the principal magnetic storms.

3489. Heck, N. H., Earthquakes, 230 pp., Princeton Univ. Press, 1936. Price, $3.50.

The book begins with a brief description of the vibrations that originate within the earth. Effects of earth tremors, cause of earthquakes, modern methods of studying earthquakes, analysis and interpretation of earthquake records, the process of locating earthquake epicenters and foci are described and explained.

3490. Institution of Petroleum Technologists, Petroleum—Twenty-five years' retrospect, by twenty-five authors, 219 pp., 42 illus., London, 1935. Price, $2.

The general theme of the book is briefly to record the progress of all phases of the petroleum industry from 1910 to 1935.

3491. Kohlrausch, F., and others, Praktische Physik zum Gebrauch für Unterricht, Forschung und Technik [Practical physics for use in teaching, research, and technics], 958 pp., 512 figures, 73 tables, Leipzig, B. G. Teubner, 1936. Price, RM. 32.

Consists of six main parts—(1) General remarks on measurements; (2) Mechanics; (3) Heat; (4) Optics; (5) Electricity and magnetism; (6) Corpuscles and energy-quanta.

3492. Macelwane, J. B., and Sohon, F. W., Introduction to theoretical seismology, Part 1, Geodynamics, by J. B. Macelwane, 366 pp., 67 figures, 15 plates, tables, New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Ltd., 1936. Price, $6.

Contents: (1) Stresses in an elastic solid; (2) Elastic strain; (3) Relations between stress and strain; (4) Elastic body waves: 1, Waves in the interior of an isotropic elastic solid; 2, Waves in a gravitating, compressible planet; (5) Surface waves on the plane boundary of an isotropic elastic solid: 1, Rayleigh waves; 2, Love waves; (6) Vector treatment of elastic waves; (7) Reflection and refraction of elastic waves; (8) Paths of seismic rays; (9) Interpretation of seismograms; (10) Determination of epicenters; (11) Depth of focus; Appendix 1; Appendix 2; List of symbols; Index.

In concluding the introduction the author writes:

"The study of the underlying theory of seismology will benefit the geologist, for it will give him new methods of dealing with a whole class of important phenomena relative to faulting, mountain-building diastrophism, and regional distortion and will acquaint him with structural features of the earth, both in the crust and deep in the interior, which otherwise would be unknown. The physicist will find it of interest for the study of mechanics and especially of elasticity, for it will put him in possession of methods applicable in a laboratory in which are available forces and distances of such magnitude as otherwise to be totally beyond his reach. He can thus deal with short and long elastic waves and with paths through the earth much as he deals with all forms of electromagnetic waves in space. The mining engineer will find in this study enlightenment on the behavior of active faults that traverse his workings and assistance in taking proper precautions. The civil engineer will see its immediate application to the location and design of bridges, dams, and pipe lines, and to nearly all structures for which he is responsible. The architect and the structural engineer will derive from theoretical seismology principles and methods that will aid them greatly in securing the information they need for the design of buildings least liable to damage by earthquake vibrations. To the geophysicist the study of theoretical seismology is indispensable.

"Since seismology embraces the underlying principles of both the geological and physical branches of the science, it is a border-line subject. Either aspect may therefore be emphasized. In the present volume the stress is placed on the mathematical and physical theory."

3493. National Research Council, Transactions of the American Geophysical Union, 17th annual meeting, April 30, May 1, 2, 1936.

Part 1 (pp. 1–260): Introduction, by Jno. A. Fleming, pp. 3–5; General assembly, pp. 8–34, Reports of committees; Symposium on recent trends in geophysical research; Resolutions adopted.

Section of geodesy, pp. 35–74, Reports and papers: (1) State geodetic control surveys, by H. W. Hemple; (2) Guatemala-Honduras boundary, by J. P. Lustene; (3) Use of color filters on geodetic instruments, by H. C. Warwick; (4) Report on absolute value of gravity at Washington, by P. R. Heyl; (5) Recent developments in gravity instruments, by A. J. Hoskinson; (6) The Hawaiian Island arc, by Paul

Bartsch; (7) Study of earth tides by gravitational measurements, by R. D. Wyckoff; (8) Field operations of the Geodetic Survey of Canada for 1935, by N. J. Ogilvie; (9) Progress of the geodetic work of the Coast and Geodetic Survey during the past year, by C. L. Garner; (10) Geodetic work in Mexico during the year 1935, by Manuel Medina; (11) An interpretation of gravity anomalies in terms of local and regional geologic structures, by G. P. Woollard.

Section of seismology, pp. 75–116, reports and papers: (1) Progress report on a three-component seismometer and tiltmeter, by L. B. Slichter; (2) Progress report on the research connected with the Timiskaming earthquake of November 1, 1935, by Ernest A. Hodgson; (3) Current geophysical activity in Texas and Louisiana, by Donald C. Barton; (4) Progress report in seismology for the United States Coast and Geodetic Survey, by E. W. Eickelberg; (5) Geological implications of deep-focus earthquakes, by V. C. Stechschulte; (6) Progress in engineering-seismology research at Massachusetts Institute of Technology, by Arthur C. Ruge; (7) Improvements in strong-motion seismographic equipment, by R. E. Gebhardt; (8) Sand craters and their possible significance, by P. O. Macqueen; (9) A genetic system of earthquake origin, by H. Landsberg; (10) Relation of earthquake belts of the Pacific and Indian Oceans to submarine topography, by N. H. Heck; (11) Review of earthquakes for the past year, by E. W. Eickelberg; (12) Reflection dip-shooting methods in seismic prospecting, by H. M. Rutherford; (13) Transforming the stereographic map, by F. W. Sohon; (14) The determination of ground motion from seismograms, by A. Blake; (15) Seismographic tilt measurements at Buffalo, by John P. Delaney; (16) Local earthquakes in New England, 1934–35, by M. P. Collins; (17) The new seismic vault at Fordham, by J. J. Lynch; (18) Correlations between tilting of the ground and the tides in Chesapeake Bay, by George Merritt; (19) A discussion of some problems in epicenter work, by R. R. Bodle; (20) Deep-focus earthquakes from a geologist's point of view, by W. T. Thom, Jr.; (21) A mechanical method of analyzing accelerograms, by Frank Neumann; (22) Comment on F. W. Sohon's paper, Transforming the stereographic map, by W. L. G. Joerg.

Section of meteorology, pp. 117–157, reports and papers: (1) Symmetry-points in the air pressure, by B. Haurwitz; (2) An example of long-range forecasting of precipitation on a drainage area, by Samuel Shulits; (3) The 9-month period in the variations of solar and meteorological phenomena, by H. W. Clough; (4) Statistical aspects of long-range weather forecasting, by A. G. McNish; (5) Eclipse meteorology, with special reference to the total solar eclipse of 1932, by S. P. Fergusson, C. F. Brooks, and B. Haurwitz; (6) Measurements with a climatological ultraviolet dosimeter in central Pennsylvania, by H. Landsberg; (7) Pilot-balloon observations at sea, by A. R. Stickley; (8) A preliminary summary of the Multanovski school of long-range weather forecasting, by Irving I. Schell; (9) Meteorological features indicated by air-conductivity measurements made on flight of Explorer II, by O. H. Gish and K. L. Sherman.

Section of terrestrial magnetism and electricity, pp. 157–192, reports and papers: (1) Magnetic work of the Dominion Observatory during 1935, by R. M. Stewart; (2) Magnetic work of the United States Coast and Geodetic Survey, April 1935 to March 1936, by R. S. Patton; (3) Recent progress in the laboratory investigations of the aurora and light of the night sky, by Joseph Kaplan; (4) Magnetic and electric investigations of the Department of Terrestrial Magnetism of the Carnegie

Institution of Washington, April 1935 to March 1936, by J. A. Fleming; (5) Research in atmospheric electricity at Stanford University, by N. E. Bradbury; (6) Report of the magnetic work at the Astronomical Observatory of Mexico during the year 1935, by Joaquín Gallo; (7) Work in geophysics of the Colorado School of Mines during 1935, by D. Wantland; (8) Researches related to terrestrial magnetism and electricity of the United States Naval Research Laboratory, by H. M. Cooley; (9) Research at Mount Wilson Observatory of the Carnegie Institution of Washington, relating to terrestrial magnetism, by S. B. Nicholson; (10) Auroral and ionospheric station at the University of Alaska, by E. H. Bramhall; (11) Ionosphere researches of the National Bureau of Standards, by J. H. Dellinger; (12) Progress report on the investigations of magnetic bays, by A. G. McNish; (13) Improved instruments and methods for magnetic measurements, by H. E. McComb; (14) Sunspot activity and radio transmission fade-outs, by R. S. Richardson; (15) Some observations on the diurnal variation of the vertical intensity of the earth's magnetic field, by Victor Vacquier; (16) Magnetic anomalies in the Carolina Coastal Plain, by G. R. MacCarthy; (17) Application of alternating-current methods of detection to earth inductors for marine and land observations, by E. A. Johnson; (18) Undirectional cosmic-ray intensities and their variation with latitude, by T. H. Johnson; (19) New factors in investigation of the ionosphere, by L. V. Berkner, H. W. Wells, and S. L. Seaton; (20) On the effective group velocities of low-frequency radio time signals and the apparent variability of velocity with the region of the earth traversed, by H. T. Stetson; (21) Potential distribution about a leaky cylinder, by L. B. Slichter; (22) Actual and potential results from electrical exploration of the atmosphere, by O. H. Gish; (23) Magnetic survey in the Lehigh Valley, by Maurice Ewing and H. H. Pentz.

Section of oceanography, pp. 193–232. Ten reports and papers.

Section of volcanology, pp. 233–259. Nine reports and papers.

Part 2 (pp. 261–563): Reports and papers, Section of hydrology and Western interstate snow-survey conference. Contains 37 reports and papers.

Copies of the Transactions may be purchased by nonmembers of the Union at the following postpaid prices: Part 1, $1.50; part 2, $2. Orders, with checks payable to American Geophysical Union, should be addressed to the general secretary, American Geophysical Union, 5241 Broad Branch Road NW., Washington, D. C., U. S. A.

3494. Neumann, Frank, United States earthquakes, 1934: U. S. Coast and Geodetic Survey Serial 593, 1936. Price, 15 cents.

This publication is a summary of earthquake activity in the United States and the regions under its jurisdiction for the calendar year 1934. Contents: (1) Introduction; (2) Noninstrumental results; (3) The Utah earthquake of March 12, 1934; (4) The Parkfield earthquake of June 7, 1934; (5) The Panama earthquakes of July and August 1934; (6) Seismological observatory results; (7) Strong-motion seismograph results; (7) Tilt observations; (8) Additions and corrections to previous publications. Contains 27 illustrations.

3495. Reich, Prof. Dr. H., Angewandte Geophysik für Bergleute und Geologen [Applied geophysics for mining engineers and geologists], vol. 1, 151 pp., 74 figs., Leipzig, Akademische Verlagsgesellschaft m. b. H. 1933; vol. 2, 153 pp., 73 figs., 1934.

Contents, volume 1: (A) General remarks on geophysical methods; (B) Geophysical investigation of areas for exploration of the structure of the earth in general: (1) Geological and physical foundations; (2) Gravity measurements; (3) Magnetic measurements; (4) Earthquake measurements; (C) Geophysical exploration of ore deposits: (I) Sedimentary ore deposits: (1) Physical properties of sedimentary rocks; (2) Methods of investigation; (3) Results; volume 2: (II) Magmatic deposits: (1) Physical properties of eruptive rocks, crystalline slates, and mineral lodes; (2) Methods of investigation; (3) Results; (D) Geophysical investigations in connection with other technical purposes such as discovery of useful minerals, providing with water, in construction work.

3496. Schmidt, Adolf, Tafeln der normierten Kugelfunktionen [Tables of normalized spherical harmonics], 52 pp., Gotha, Engelhard-Reyher Verlag, 1935. Price, RM.6.60.

A review of this book is given by J. Bartels in Terrestrial Magnetism and Atmospheric Electricity, vol. 41, no. 3, p. 264, 1936. According to Bartels, these tables should be in the hands of every geophysicist whose work deals with the earth as a whole. It would be desirable if the normalization, as introduced by Schmidt, could find general recognition and application.

3497. Schultz, W., Louis, H., and Goethe, E., Bergtechnisches Taschenwörterbuch [Technical mining pocket dictionary], part 2, German-English, 76 pp., Essen, Verlag Glückauf G. m. b. H. Price, RM.4.20.

3498. von Srbik, Robert, Geologische Bibliographie der Ostalpen von Graubünden bis Kärnten [Geologic bibliography of the East Alps from Graubünden to Kärnten], vol. 1, pp. 1–687; vol. 2, pp. 688–1412, issued by the Deutscher und österreichischer Alpenverein [German and Austrian Alpine Society], Munich and Berlin, R. Oldenbourg, 1935.

More than 50,000 works written by more than 3,600 authors are collated. The material is arranged in 54 groups according to regions and in 17 groups according to the subject-matter. Of special interest for geophysicists are the groups dealing with earthquakes, gravity, glaciology, etc.

3499. Stocks, Theodor, and Wüst, Georg, Die Tiefenverhältnisse des offenen Atlantischen Ozeans [Depth conditions of the open Atlantic Ocean], explanatory remarks to the outline map 1/20 millions, reprint from the "Wissenschaftliche Ergebnisse der Deutschen atlantischen Expedition auf dem Forschungs und Vermessungs Schiff *Meteor*, 1925–27" [Scientific results of the German Atlantic Expedition on the discovery and measurement ship *Meteor* in 1925–27], vol. 3, part 1, 32 pp., with 11 figs. in text, 3 figs. on 2 plates, and 1 supplement in colors, Berlin and Leipzig, Verlag von Walter de Gruyter & Co., 1935. Price, RM.6.

3500. Vasiliev, A. A., and Katiaiev, V. A., Geophysical methods of prospecting in western Siberia [in Russian], 259 pp., figures, maps, Tomsk, West Siberian Geological, Hydrological, and Geodetical Trust, 1935. Price, 10 rubles.

This is a collection of articles on geophysics: (1) Geophysical methods of prospecting in western Siberia, by A. A. Vasiliev and V. A. Katiaiev; (2) Contribution to the question of solving the reverse geophysical problem by using magnetic fields, by J. N. Lapinsky; (3) Table of values of Va and ha for an infinitely long elliptical cylinder, by J. N. Lapinsky; (4) On the determination of a most favorable net for discovering ferromagnetic ores on the Shoria table-land, by J. N. Lapinsky; (5) Absolute survey of the Tashtagol iron-ore deposit, by A. T. Perezhogin; (6) The resistance method in solving the problems of structural geology, by V. A. Katiaiev; (7) Contribution to the question of calculating the geometrical net for magnetic surveys, by M. A. Zablotskaia; (8) On the determination of magnetic properties and species of rock by the deviation apparatus, by N. J. Zakharenko; (9) Electrical prospecting on the Berikulsk gold-bearing deposits, by V. V. Borodin; (10) Radiometric investigations in western Siberia, by O. V. Udodova; (11) Seismic prospecting in Kuznetsk Basin, by M. A. Baldin; (12) Results of observations with the gravitational variometer in the Kulundinsk Steppe in the summers of 1932 and 1933, by S. N. Bazhenov; (13) On corrections in interpreting seismic materials, by G. D. Legeza; (14) Schemes of an additional lever for the vertical mechanical seismograph and schemes of a horizontal direction seismograph, by G. D. Legeza; (15) On the arrangement of seismic survey in the Kuznetsk Basin, by G. D. Legeza; (16) Application of the horizontal seismograph for determining the direction of the explosion, by G. D. Legeza.

3501. Willis, Bailey, The east African plateaus and rift valleys—Studies in comparative seismology: Carnegie Inst., Washington, Pub. 470, 358 pp., 16 figs., 1936.

An extensive description of African rift valleys and plateaus, with the author's hypothesis of their origin. Earthquakes, gravity tests, and volcanism are briefly mentioned.

10. PATENTS

3502. Method and apparatus for seismic prospecting; Ludwig W. Blau and Louis Statham, Houston, Tex., assignors to Standard Oil Development Co., a corporation of Delaware: U. S. patent 2046104, issued June 30, 1936.

This invention relates to an apparatus for recording seismic disturbances, comprising a seismograph, means of greater conductivity than the surface layer of the ground for simultaneously collecting over an area larger than the base of the seismograph all the energy arriving through the ground by different paths and for conducting the collected energy to the seismograph to cause the direct waves to actuate the seismograph at successive intervals of time while the reflected waves received at the area actuate the seismograph simultaneously. Claims allowed, 17.

3503. Method and apparatus for seismic-electric prospecting; Ludwig W. Blau and Louis Statham, Houston, Tex., assignors to Standard Oil Development Co., a corporation of Delaware: U. S. patent 2054067, issued September 15, 1936.

This invention relates to the method of geophysical exploration which comprises receiving over a continuous extended volume of the ground, including subsurface strata, wave energy arriving throughout the volume from a source of propagation of seismic waves, and obtaining an indication due to the effect of this wave energy on the electrical properties of the volume of ground. Claims allowed, 28.

3504. Seismic prospecting; Ludwig W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware: U. S. patent 2055476, issued September 29, 1936.

This invention relates to a seismic measuring system including a source of direct and reflected seismic waves, apparatus for differentiating between a reflected mechanical wave having small horizontal components and a direct mechanical wave having large horizontal components, each in comparison with their vertical component, which comprises means for separately transforming the vertical and horizontal components of the waves into electric currents, means for adjusting the amplitude of the horizontal components against the vertical, and means for opposing the electric current of the horizontal components against the current of the vertical component whereby the total current is greatly reduced for direct waves and the current for reflected waves is substantially unaffected. Claims allowed, 10.

3505. Electrical circuits for seismic prospecting; Ludwig W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware: U. S. patent 2055477, issued September 29, 1936.

This invention relates to seismic prospecting in which earth vibrations are produced, the first cycles of each of which are smaller than the later cycles; apparatus for recording the beginning of the vibrations, which comprises means for transforming the vibrations into electric pulsations, means for transmitting the pulsations along an electric circuit, means for turning the circuit to the frequency of the particular electric pulsations caused by the portion of the earth vibrations of predominant frequency, means for damping the circuit more than critically whereby the ratio of first-cycle amplitude to second-cycle amplitude of the particular electric pulsations is increased, and means for recording the amplified first cycle. Claims allowed, 11.

3506. Tamping for explosives; Ludwig W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware: U. S. patent 2055618, issued September 29, 1936.

This invention relates to an apparatus for directing explosive energy in a given direction, which comprises means for confining an explosive charge against a surface to be blasted, the means comprising magnesium oxychloride which when set has a density greater than 2.5 and a velocity of sound through it greater than 2,500 meters per second. Claims allowed, 2.

3507. Reflection-shooting procedure for the accurate determination of dip; Ludwig W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware: U. S. patent 2058764, issued October 27, 1936.

This invention relates to the method of determining the dip of a given subsurface stratum, the steps which comprise successively creating seismic waves at a plurality of spaced shot points, and in turn simultaneously receiving the waves from each shot point at a plurality of receivers disposed on lines between the shot points. Claims allowed, 22.

3508. Apparatus for determining subsurface tectonics of the earth; John C. Karcher, Dallas, Tex.: U. S. patent 2044079, issued June 16, 1936.

This invention relates to apparatus for determining the difference in the gravitational constant between a plurality of spaced points comprising a plurality of similarly constructed Kelvin balances disposed at said points and electrically connected in series whereby to obtain a uniform magnetic flux in the coils of said balances, and means for indicating any difference of equilibrium between the several balances at said several points. Claims allowed, 5.

3509. Apparatus for determining well temperatures; Ernest N. Merrill and George A. Young, Long Beach, Calif., assignors to Shell Development Co., San Francisco, Calif., a corporation of Delaware: U. S. patent 2053967, issued September 8, 1936.

This invention relates to a temperature-indicating device for boreholes, comprising a sealed metallic casing substantially filled with liquid and adapted to be placed in a borehole, and a plurality of solid fragments having calibrated melting points, said fragments being spaced from each other within the casing and immersed in the liquid filling said casing. Claims allowed, 5.

3510. Subsurface surveying; Willard North, Los Baños, Calif., assignor to Geophysical Research Corporation, New York, N. Y., a corporation of New Jersey: U. S. patent 2059018, issued October 27, 1936.

This invention relates to the method of exploring geologic formations which comprises producing a source of artificial seismic waves, receiving said waves by detectors arranged at progressively greater distances from the wave source, and impressing the output of each detector upon a plurality of recorders, one or more of said recorders being arranged to record the combined output of several detectors. Claims allowed, 23.

3511. Method of making geophysical explorations; Harold R. Prescott and Frank L. Searcy, Ponca City, Okla., assignors to Continental Oil Co., Ponca City, Okla., a corporation of Delaware: U. S. patent 2046843, issued July 7, 1936.

This invention relates to an electrical circuit for detonating an explosive charge in the making of geophysical explorations, comprising a bridge wire of a detonator, a source of potential, and a resistance connected in series; a shunt circuit for said resistance, and means for recording fluctuations of current in said shunt circuit. Claim allowed, 1.

3512. Method of geological exploration; Harold R. Prescott and Frank L. Searcy, Ponca City, Okla., assignors to Continental Oil Co., Ponca City, Okla., a corporation of Delaware: U. S. patent 2049724, issued August 4, 1936.

This invention relates to a method of geologic exploration, including the steps of creating elastic waves at or near the earth's surface, generating varying electromotive forces in sympathy with the waves produced and resulting from various subsurface geologic formations, selecting an electromotive force of a desired frequency range, and recording the voltage variation thereof. Claims allowed, 4.

3513. Method and apparatus for making geophysical explorations; Harold R. Prescott, Ponca City, Okla., assignor to Continental Oil Co., Ponca City, Okla., a corporation of Delaware: U. S. patent 2053841, issued September 8, 1936.

This invention relates to a method of making geophysical explorations, including the steps of creating elastic waves at or near the earth's surface, converting said waves and reflections thereof from geologic strata into varying electromotive forces in sympathy with said waves, selecting electromotive forces of a desired frequency range, and varying said selecting step as a function of the potential of the electromotive forces selected, and recording the voltage variations in the selected electromotive forces. Claims allowed, 7.

3514. Method and apparatus for recording elastic waves; Frank Rieber, Los Angeles, Calif.: U. S. patent 2051153, issued August 18, 1936.

This invention relates to a method of geophysical survey which comprises creating a localized disturbance in the earth, translating the vibrations resulting from said disturbance into electrical impulses at a point apart from said disturbance, and recording said impulses as a reproducible phonographic record. Claims allowed, 15.

3515. Apparatus for measuring depths; Edwin E. Turner, Jr., West Roxbury, Mass., assignor to Submarine Signal Co., Boston, Mass., a corporation of Maine: U. S. patent 2044820, issued June 23, 1936.

This invention relates to a system for measuring depths in which a sound-producing mechanism disposed to impart a sound wave to a ship's skin comprising a striking body, means for operating said striker, a diaphragm having a central boss upon which the striker strikes, an extension of said boss on the other side of said diaphragm, and nonyielding metallic means disposed between and loosely contacting with said second boss and said ship's skin. Claims allowed, 6.

3516. Surveying underground structures; Benjamin B. Weatherby, Tulsa, Okla., assignor to Geophysical Research Corporation, New York, N. Y., a corporation of New Jersey: U. S. patent 2049236, issued July 28, 1936.

This invention relates to the method of creating artificial seismic waves for use in subsurface surveying which comprises drilling a hole, filling the lower portion of said hole with solid material different from that in which the hole is drilled, drilling a hole in the filled-in material, and detonating an explosive charge in said last-named hole. Claims allowed, 9.

3517. A new or improved method of an apparatus for investigating geological structure; Dr. Ludwig Machts, of Marburga, Lahn, Germany, and Bernard Rehder, of Marburga, Lahn, Germany: British patent 433450, issued August 12, 1935.

This invention relates to a method of investigating irregularities existing below the surface of the ground, wherein a detection apparatus having an antenna is moved over a chosen path and is adapted to give substantially continuous indications in the form of oscillograph diagrams of the intensity and/or direction of the local electric fields, and means being arranged to record automatically such indications when desired, further means being also arranged for indication simultaneously of the position of the apparatus on the chosen path when such records are being made, the results of such records affording an indication of the position and nature of a local disturbance in the electric field and therefore of the position of a local subterranean irregularity. Claims allowed, 14.

3518. Improvements in apparatus for locating deposits of oil, gas, and other dielectric subterranean bodies; Sir George Croydon Marks, a member of the firm of Marks & Clerk, of 57 and 58, Lincoln's Inn Fields, London, W. C. 2, a British subject: British patent 330876, issued June 16, 1930.

This invention relates to a system for detecting the presence of oil or other dielectric deposits below the surface of the earth, and to an improved apparatus comprising a source of high-frequency alternating current, means for transmitting current from said source through relatively short and relatively long paths below the earth's surface, and means for indicating differences of characteristics between the paths. Claims allowed, 7.

3519. Pendelgerat [pendulum apparatus]; Josef André, Rochester, U. S. A.: German patent 623034, issued February 6, 1936.

This invention relates to a pendulum apparatus assigned for geophysical purposes, comprising a hollow pendulum adapted to have light rays pass through it, and an optical system below the pendulum by means of which these light rays are directed to a reading device, graduation scale, etc., or these light rays are deviated to a photographic recording device. Claim allowed, 1.

3520. Einrichtung zum Messen von Entfernungen mit Hilfe von Echos electromagnetischer Impulse [Method of measuring distances by means of the echoes of electromagnetic impulses]; Submarine Signal Co. of Boston, Mass., U. S. A.: German patent 623005, issued February 6, 1936.

This invention relates to a method of measuring distances by means of electromagnetic impulses or waves emitted periodically and received after their reflection from the object to be determined. The time interval between the direct and reflected impulses is utilized for the measurement. The method is characterized by the fact that time intervals between the impulses emitted regularly are small in comparison with the time intervals of the pauses between the emitted impulses; the measuring is made by producing phase coincidence between the direct impulses and their appropriate reflected impulses. Claim allowed, 1.

3521. Perfectionnements aux appareils pour l'exploration électrique des sondages [Improvements in the apparatus for electrical exploration of bore holes]; Conrad Schlumberger, of France (Seine); French patent 788352, issued October 9, 1935.

This invention relates to the improvements made in the apparatus described in French patent 678113. (See Geophys. Abstracts 81, p. 1695.) The new apparatus designed for measuring the electrical resistivity of rocks traversed by drilling is characterized by the fact that the three electrodes are attached to one single cable. This makes it possible to obtain precise data even at greater depths. Claim allowed, 1.

3522 Perfectionnement aux procédés et aux dispositifs pour la reconnaissance électrique des terrains recoupés par un sondage [Improvements of the methods and apparatus for electrical prospecting of the ground traversed by boring]; Conrad Schlumberger, of France (Seine): French patent 790904, issued November 29, 1935.

This invention relates to a method of measuring the resistivity of the ground at the walls of the uncased part of the hole, filled for this purpose with water. According to this method a current is sent into the ground at the levels to be investigated, by means of two electrodes connected to a source of current; the difference of potentials produced at this level is measured by means of two other electrodes. The method requires the sending of a direct current of high intensity, and that at least one of these electrodes is placed at a relatively small distance from one of the electrodes of measurement so that the difference of potentials produced between the two electrodes of measurement by passing of the current through the soil is great; this will make it possible to neglect the differences of the disturbing spontaneous potential. Claims allowed, 5.

3523. Procédé et dispositifs pour la reconnaissance électrique des terrains recoupés par un sondage [Method and apparatus for electrical prospecting of the ground traversed by boring]; Conrad Schlumberger, of France (Seine): French patent 791227, issued December 6, 1935.

This invention relates to a method for electrical prospecting of the ground traversed by drilling, according to which a current is sent into the ground by means of two electrodes connected electrically to a source of current and the difference of potentials produced between the two other electrodes is measured. All the four electrodes may be lowered into the hole to the level to be studied, or one of the sending electrodes and (or) one of the measuring electrodes may be placed on the surface of the ground. Claims allowed, 5.

3524. Method of geophysical investigations and prospecting; N. I. Sofronov and A. P. Soloviev, Geophysical Section of the Scientific Geological Research Institute: Russian patent 46313, issued March 31, 1936.

This invention relates to a method of geophysical investigations and prospecting characterized by the fact that for the purpose of making observations on the value of the polarization potentials of the electrodes, such electrodes are used the potential of which is determined, depending on concentration of electrolytes in the ground and on underground waters. Claim allowed, 1.

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—— Improvements of the methods and apparatus for electrical prospecting of the ground traversed by boring (790904)	87	3522
—— Method and apparatus for electrical prospecting of the ground traversed by boring (791227)	87	3523
Société de prospection électrique, Method for determining the depth of water flowing into the bore holes (673872)	81	2998
—— Electrical method and apparatus for determining the formations of the ground traversed by borings (678113)	81	2999
—— Method and apparatus for determining the upper level reached by the cementation of the tubing of a well (783824)	82	3045
—— Method and apparatus for determining the structure of the ground penetrated by drilling (786863)	82	3046
Sundberg, Karl, Improvements in the methods of prospecting for minerals by means of electromagnetic waves (556867)	81	2990
Turenne, Louis, Method for disclosing the presence of certain bodies in the ground or elsewhere and for studying their properties (45540/704353)	82	3043

RUSSIAN PATENTS

	No.	Abst.
Bibergal, A. V., Method of measuring radiation (45678)	86	3234
Central Scientific Research Institute of Geological Prospecting, Moscow, U. S. S. R., Method of prospecting for deposits (45363)	84	3141
Fergev, M. D., Arrangement for making connection with the ground in electrical prospecting (43983)	83	3088
Ivanov, A. G., Method for electrical prospecting for oil (43981)	83	3086
—— Method of measuring radiation (45678)	86	3234
Khmelevski, I. V., Device of magnetic prospecting for deposits (43982)	83	3087
Kniupfer, N. P., Device of magnetic prospecting for deposits (43982)	83	3087
Kuznetzov, P. P., Device of magnetic prospecting for deposits (43982)	83	3087
Naumov, B. A., Arrangement to Tiberg-Thalen magnetometer (44029)	83	3089
Platonov, A. F., Electromagnetic theodolite for determining the elements of the terrestrial magnetic field (45077)	84	3090
Sofronov, N. I., Method of geophysical investigations and prospecting (46313)	87	3524
Soloviev, A. P., Method of geophysical investigations and prospecting (46313)	87	3524
Veksler, V. I., Method of measuring radiation (45678)	86	3234
Voiutsky, V. S., Method of electrical prospecting for oil (43981)	83	3086